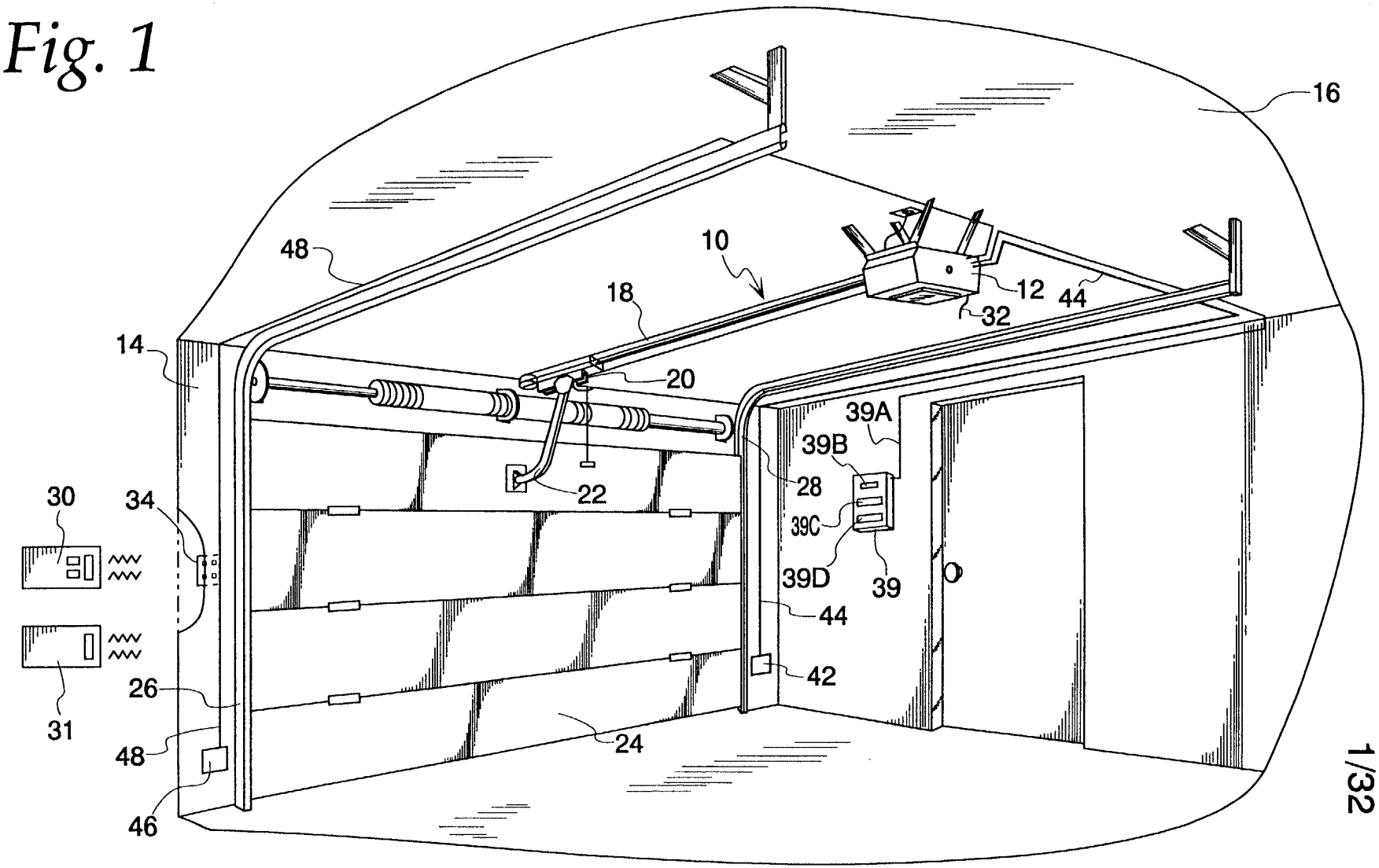
Fig. 1



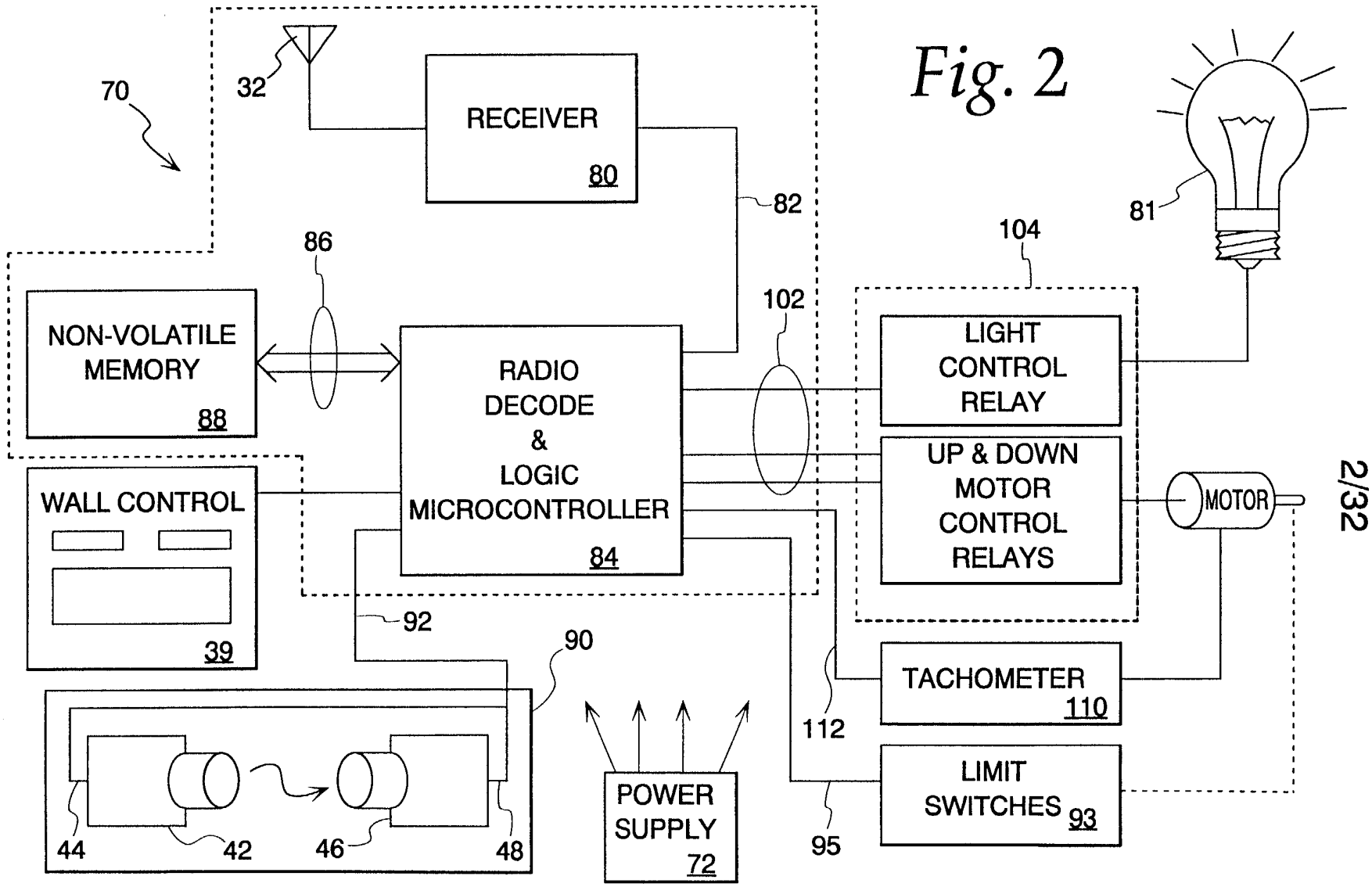


Fig. 2

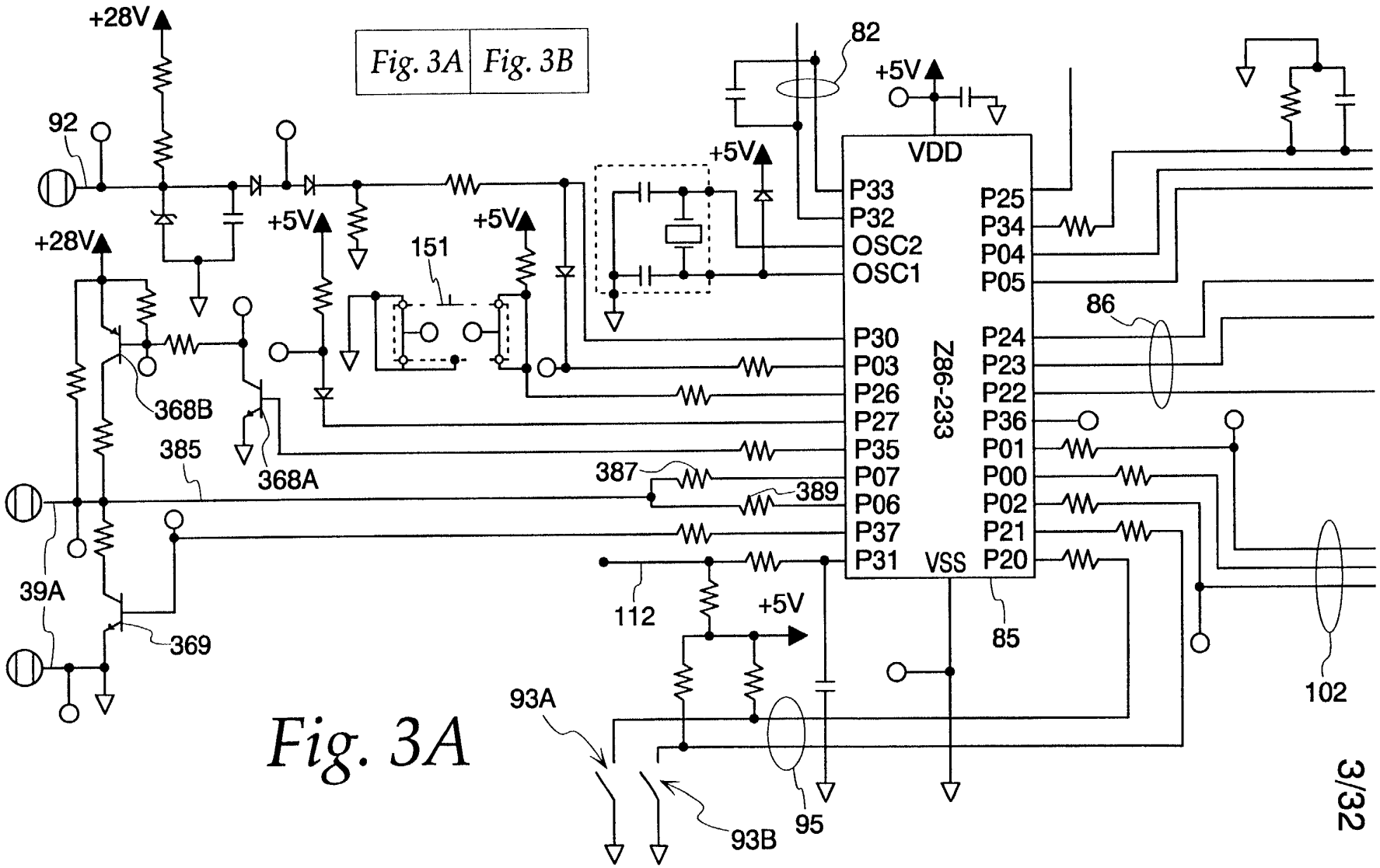


Fig. 3A
Fig. 3B
+28V
92
+28V
+5V
+5V
151
+5V
82
+5V
VDD
P33
P32
OSC2
OSC1
P30
P03
P26
P27
P35
P07
P06
P37
P31
P25
P34
P04
P05
P24
P23
P22
P36
P01
P00
P02
P21
P20
VSS
Z86-233
86
368B
385
368A
387
389
39A
369
112
+5V
85
102
93A
93B
95

Fig. 3A

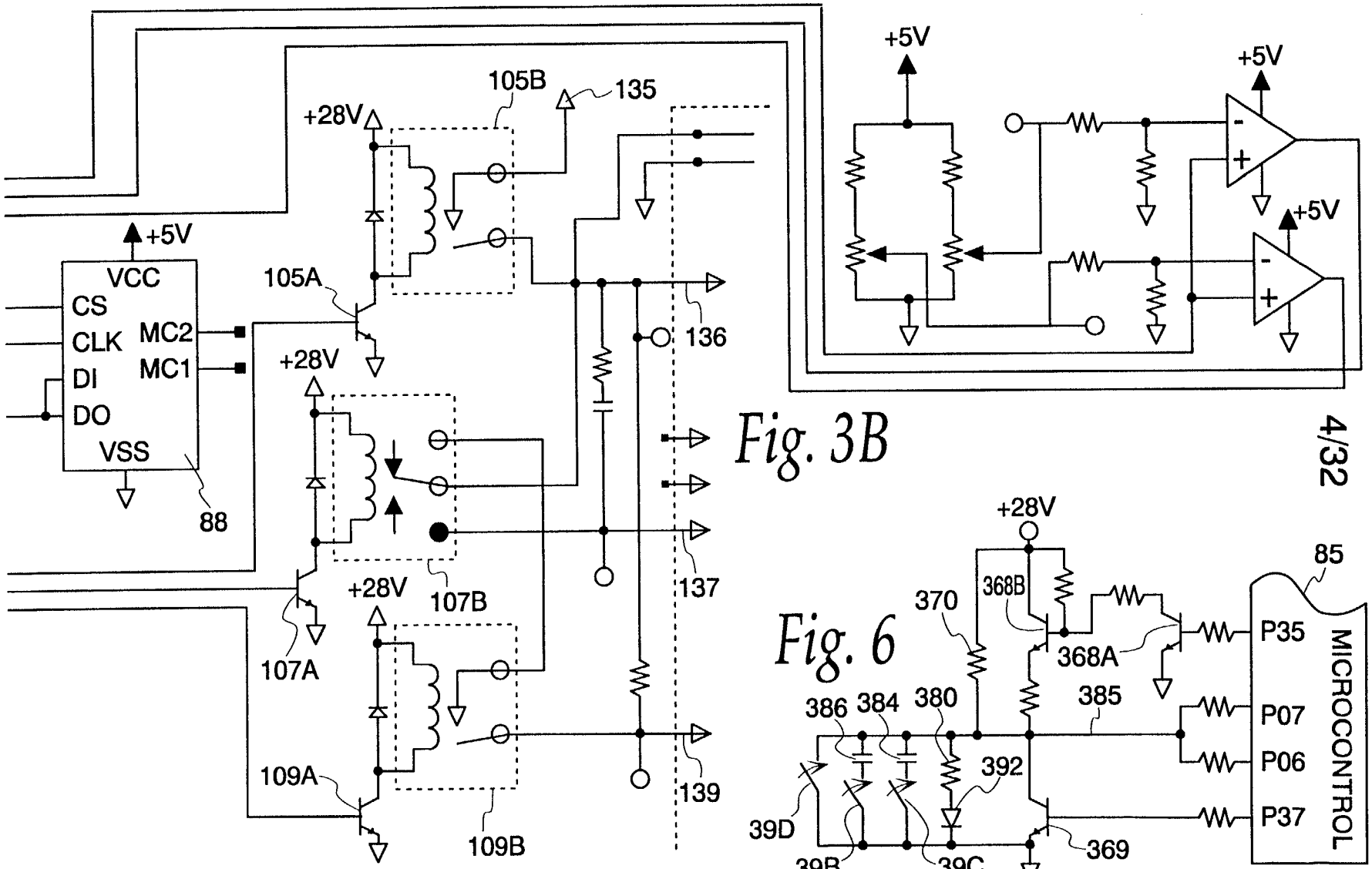

+5V
VCC
CS
CLK
DI
DO
VSS
MC2
MC1
88
105A
105B
135
+28V
136
107A
107B
137
109A
109B
139

Fig. 3B

+5V
+5V
+5V

Fig. 6

+28V
85
370
368B
368A
P35
MICROCONTROL
386
384
380
385
P07
P06
392
P37
39D
39B
39C
369

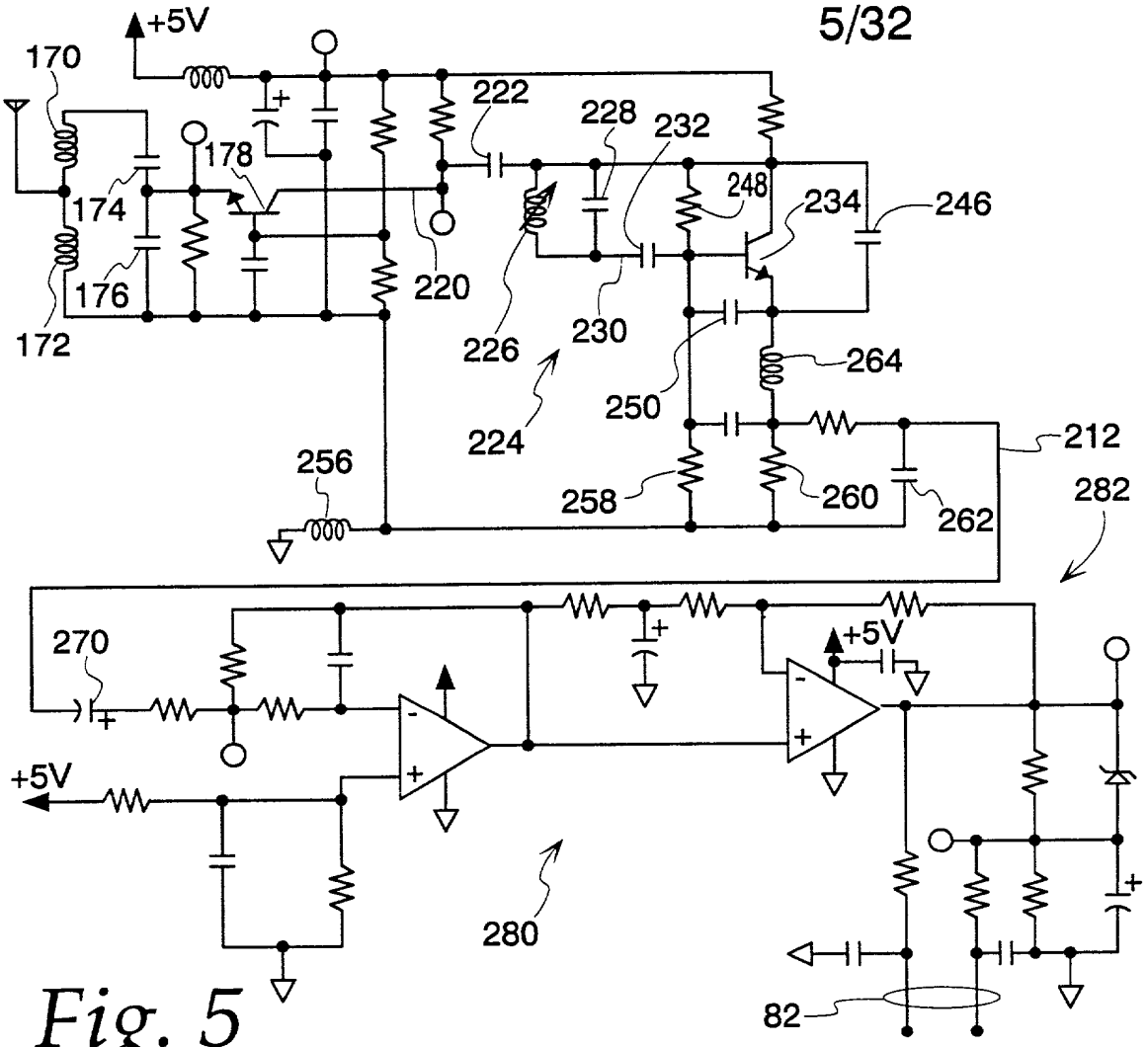

+5V
170
222
228
232
178
248
234
246
174
176
220
172
226
230
264
250
224
212
256
258
260
262
282
270
+5V
+5V
280
82

Fig. 5

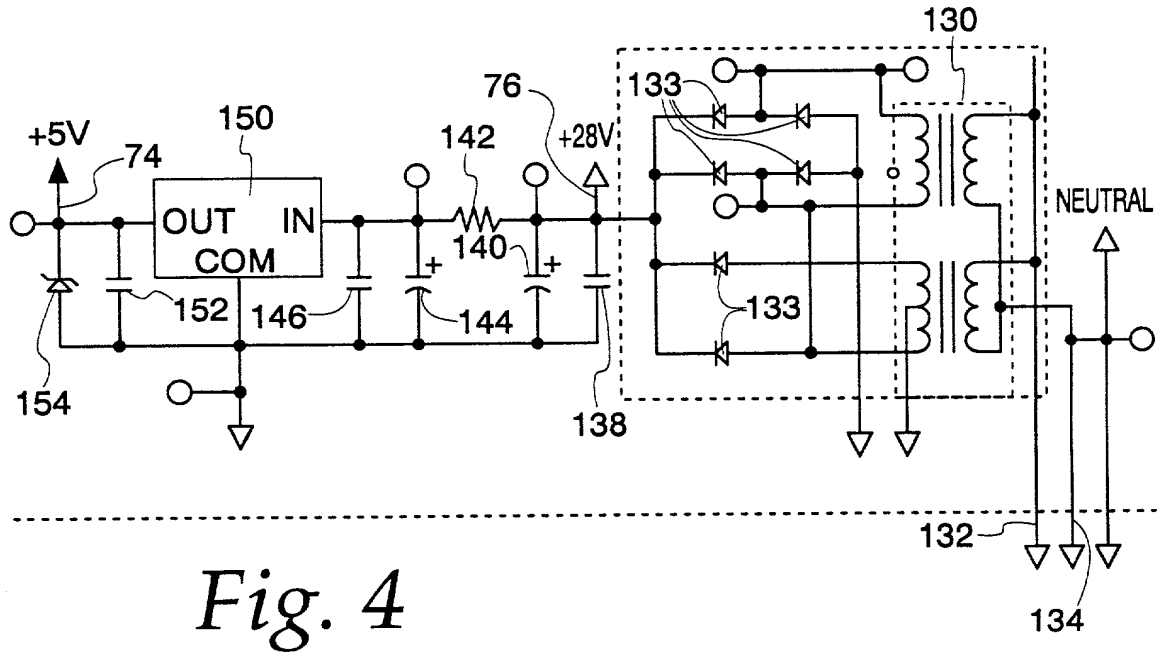

130
76
133
+5V
150
142
+28V
74
NEUTRAL
OUT
IN
COM
140
152
146
144
133
154
138
132
134

Fig. 4

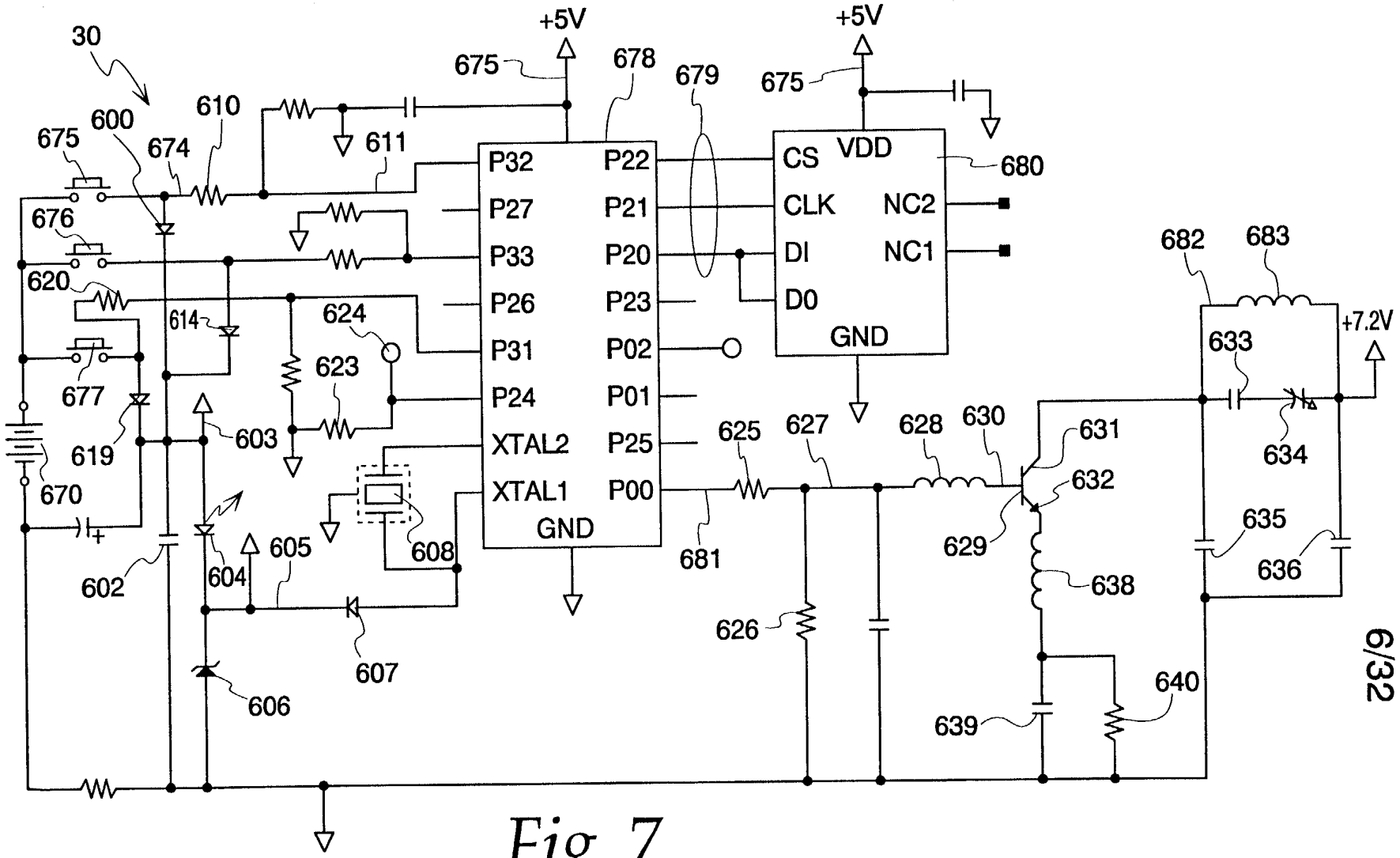


Fig. 7

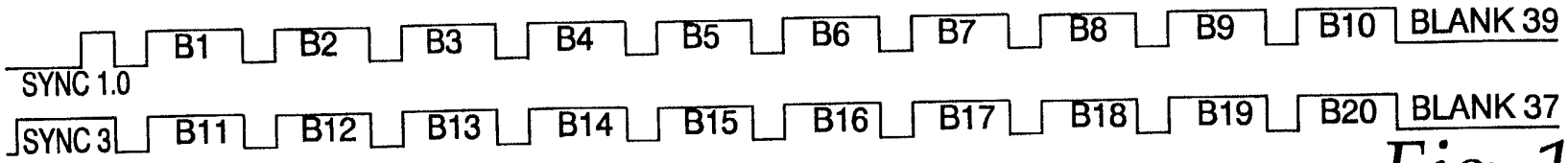


Fig. 13

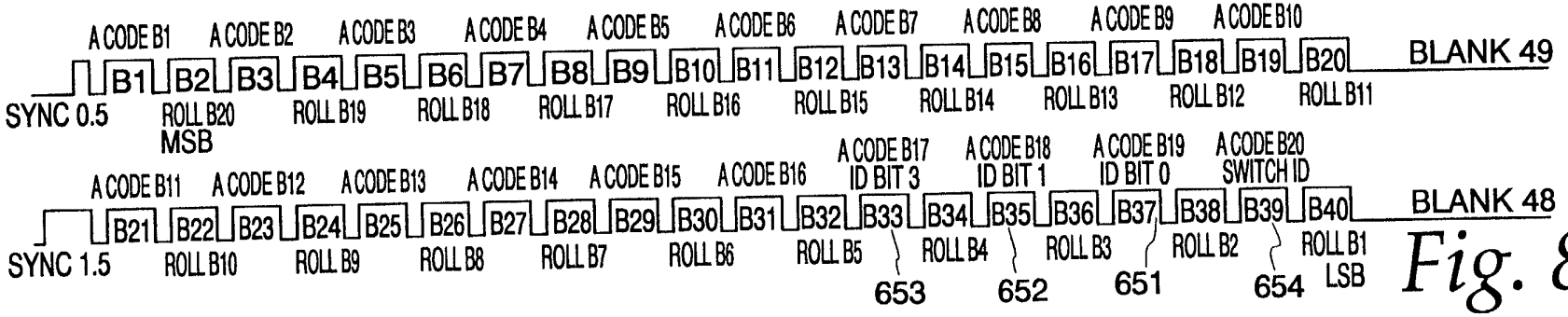


Fig. 8

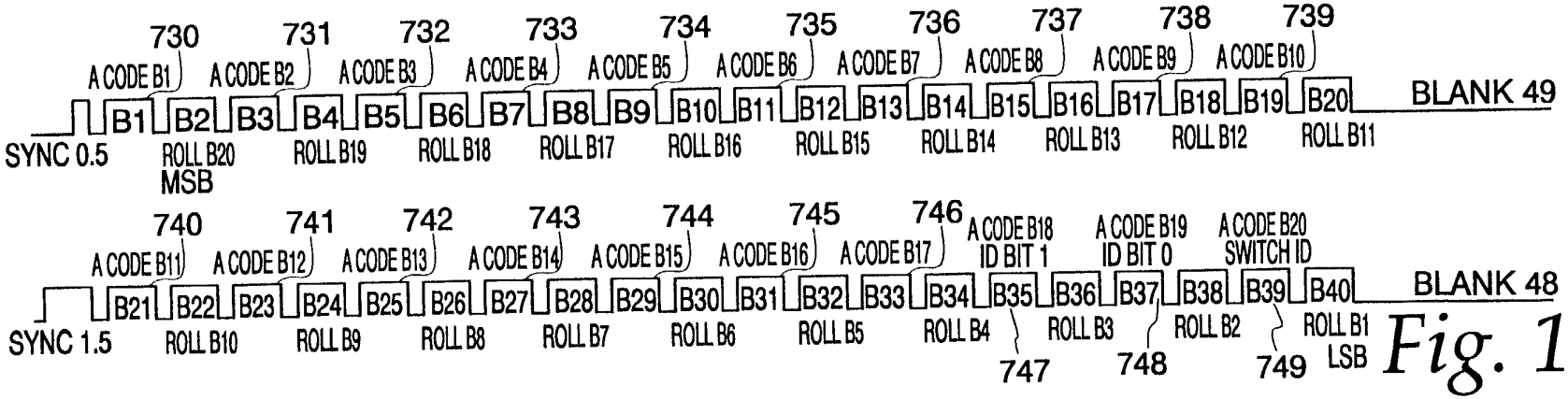


Fig. 11

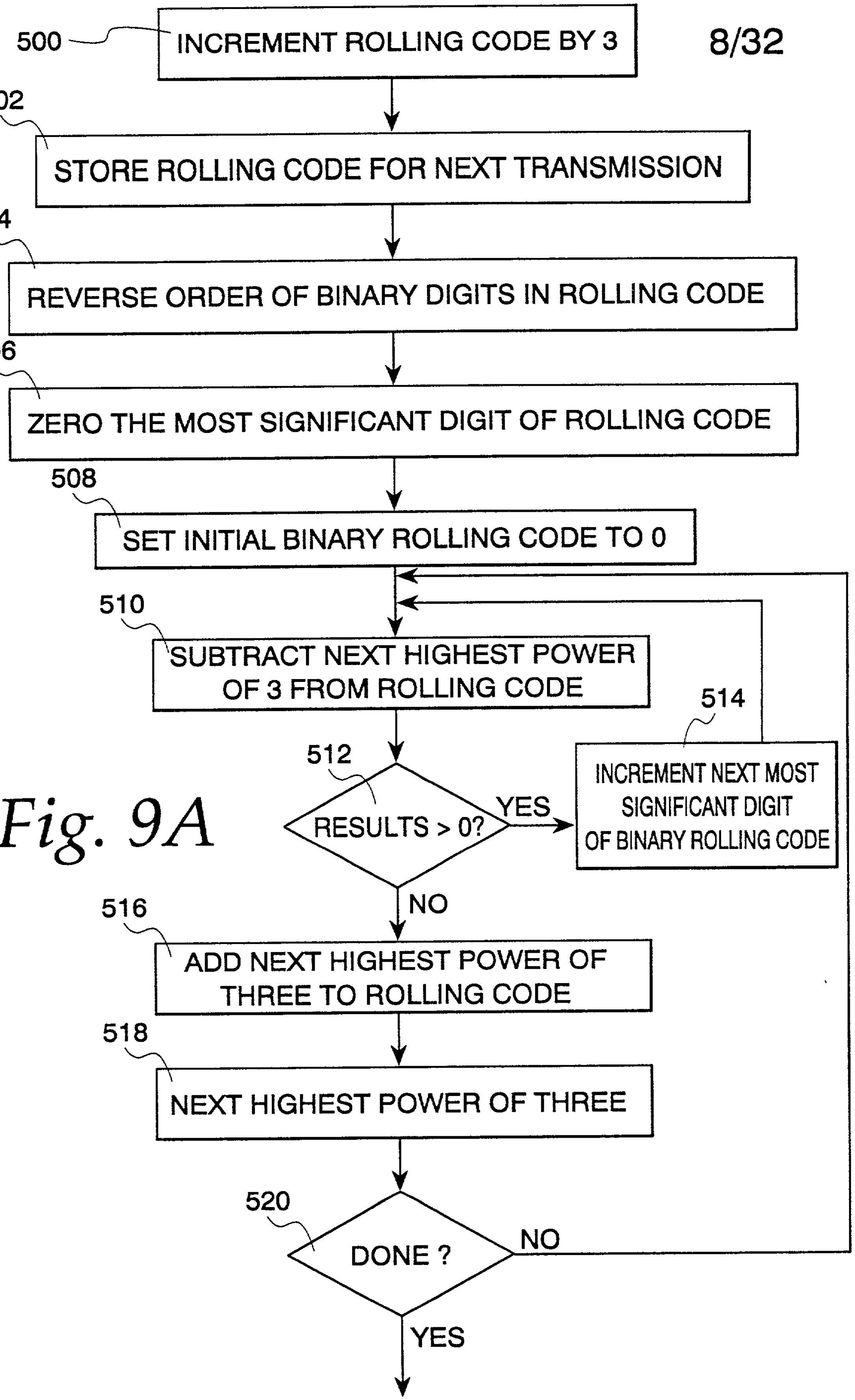

500
INCREMENT ROLLING CODE BY 3
502
STORE ROLLING CODE FOR NEXT TRANSMISSION
504
REVERSE ORDER OF BINARY DIGITS IN ROLLING CODE
506
ZERO THE MOST SIGNIFICANT DIGIT OF ROLLING CODE
508
SET INITIAL BINARY ROLLING CODE TO 0
510
SUBTRACT NEXT HIGHEST POWER OF 3 FROM ROLLING CODE
512
RESULTS > 0?
YES
514
INCREMENT NEXT MOST SIGNIFICANT DIGIT OF BINARY ROLLING CODE
NO
516
ADD NEXT HIGHEST POWER OF THREE TO ROLLING CODE
518
NEXT HIGHEST POWER OF THREE
520
DONE ?
NO
YES

Fig. 9A

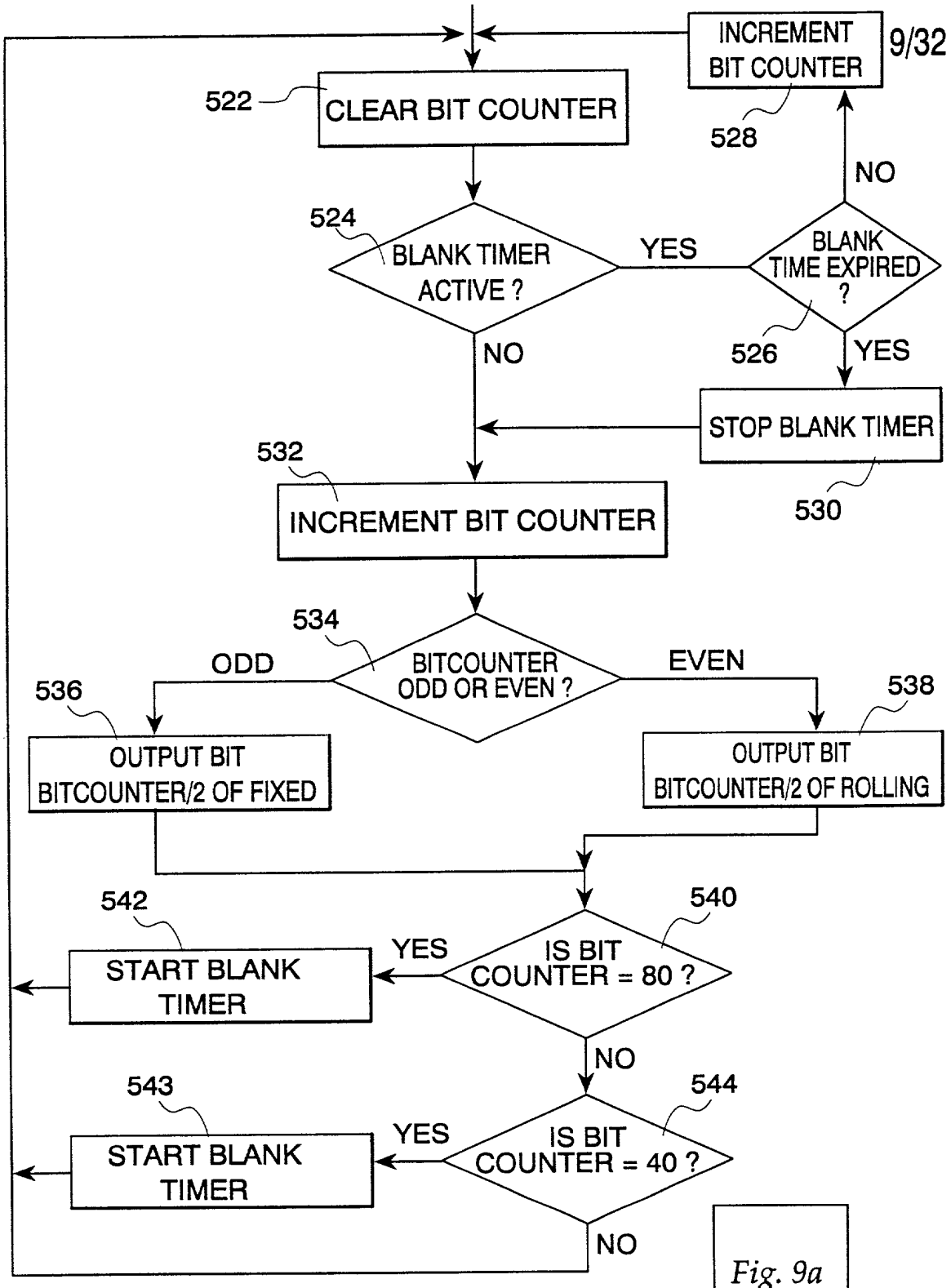


Fig. 9B

Fig. 9a

Fig. 9b

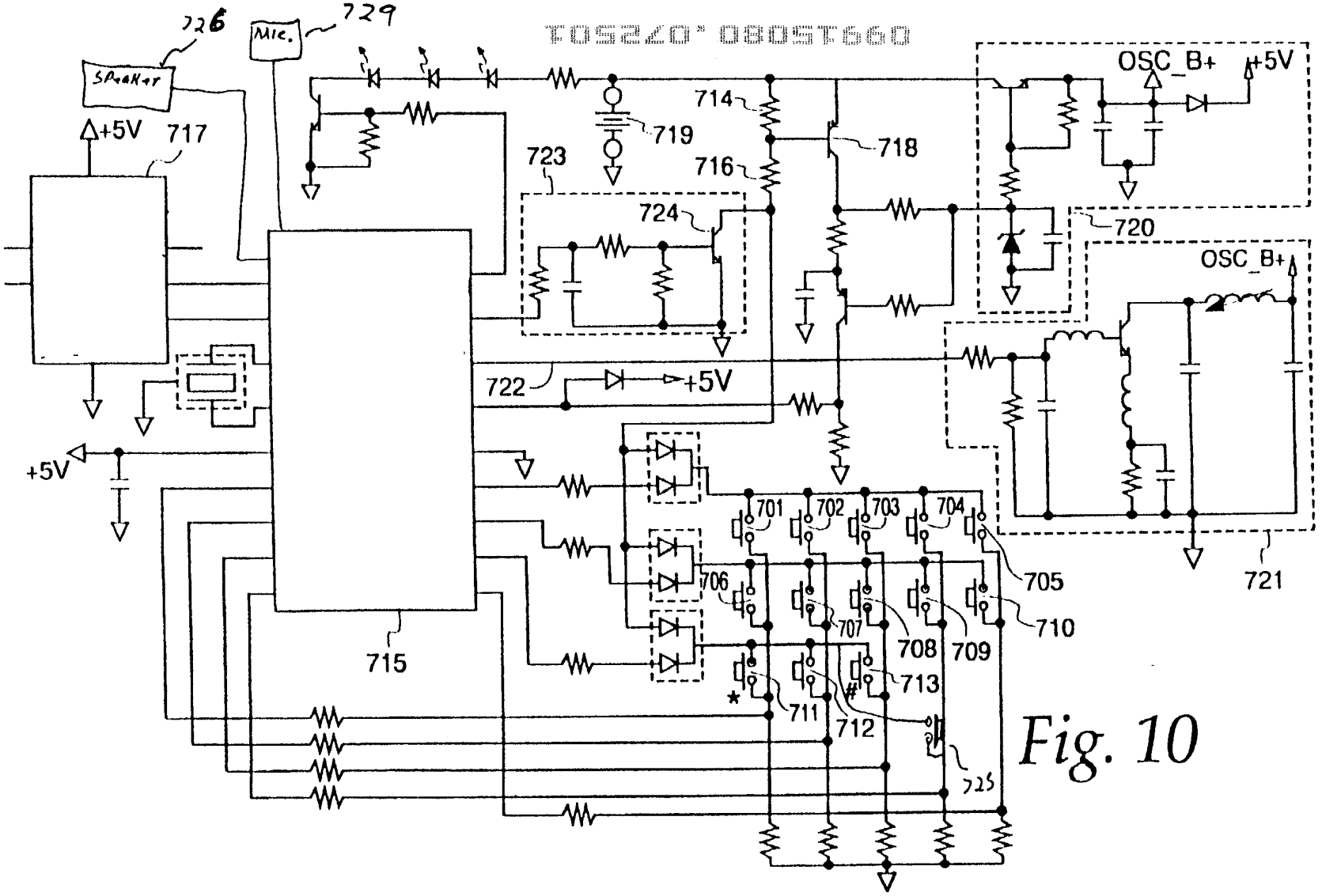


Fig. 10

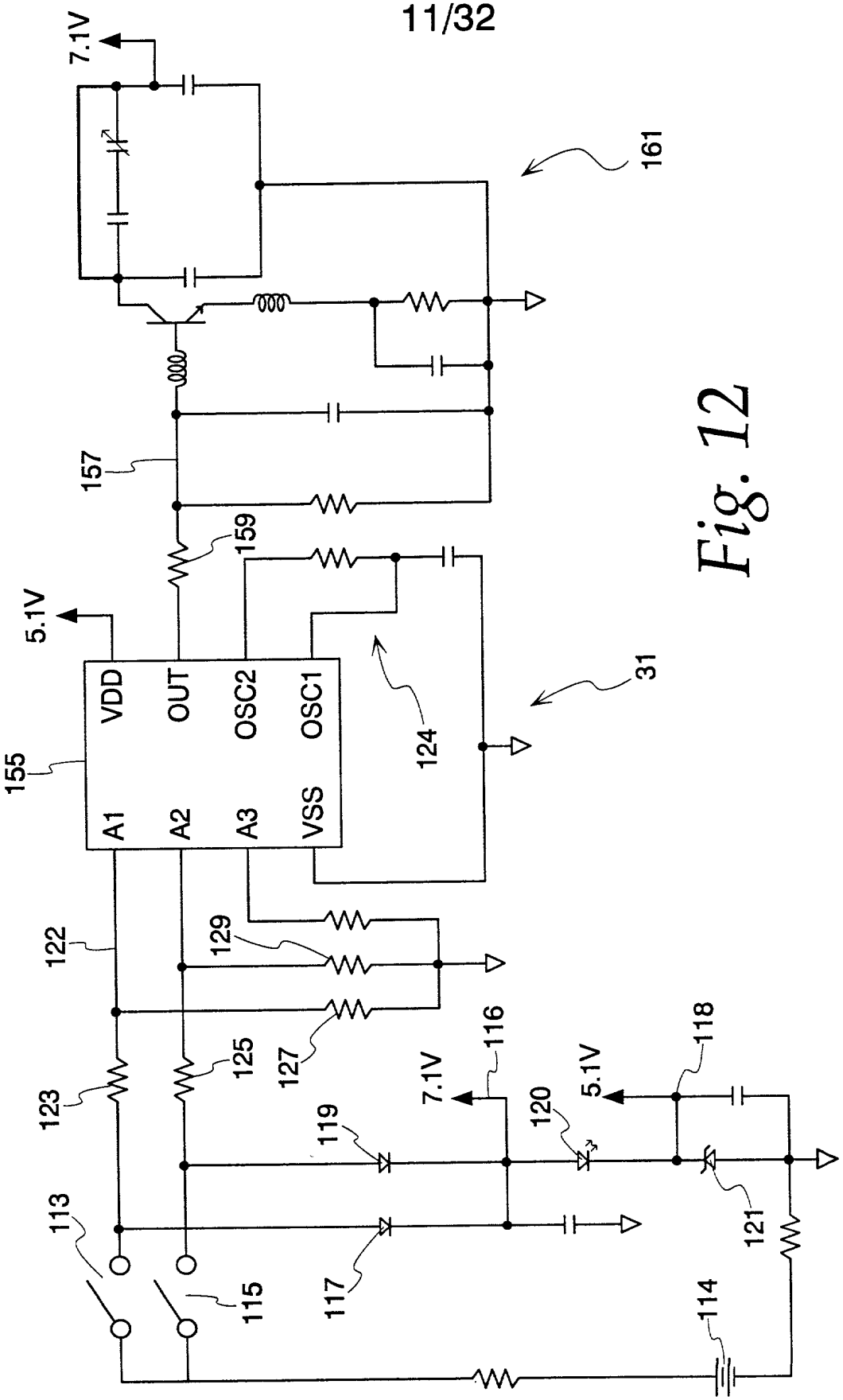
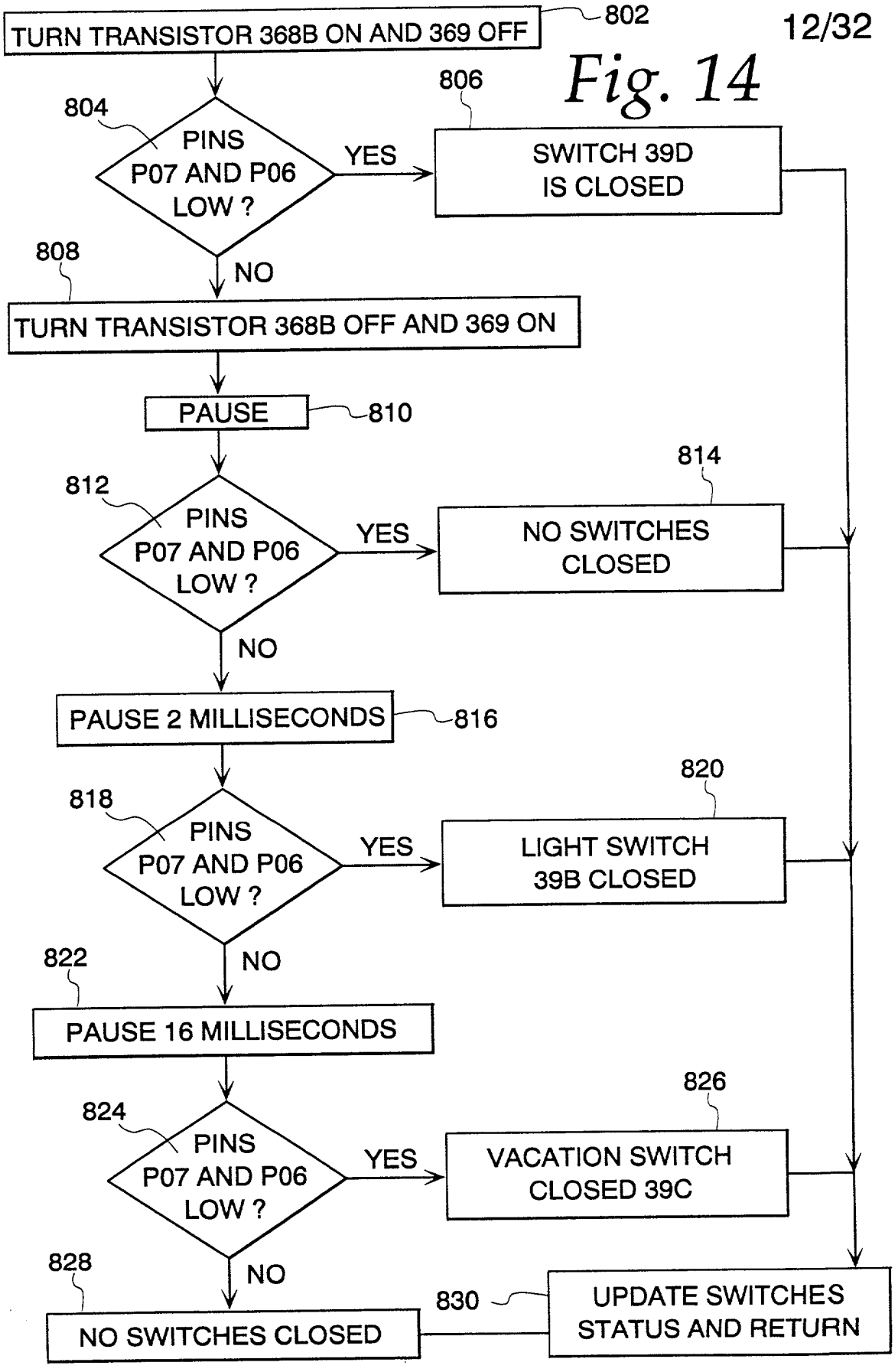

7.1V
161
157
159
5.1V
VDD
OUT
OSC2
OSC1
A1
A2
A3
VSS
155
124
31
122
129
123
125
127
7.1V
116
5.1V
118
119
120
113
115
117
121
114

Fig. 12

Fig. 14



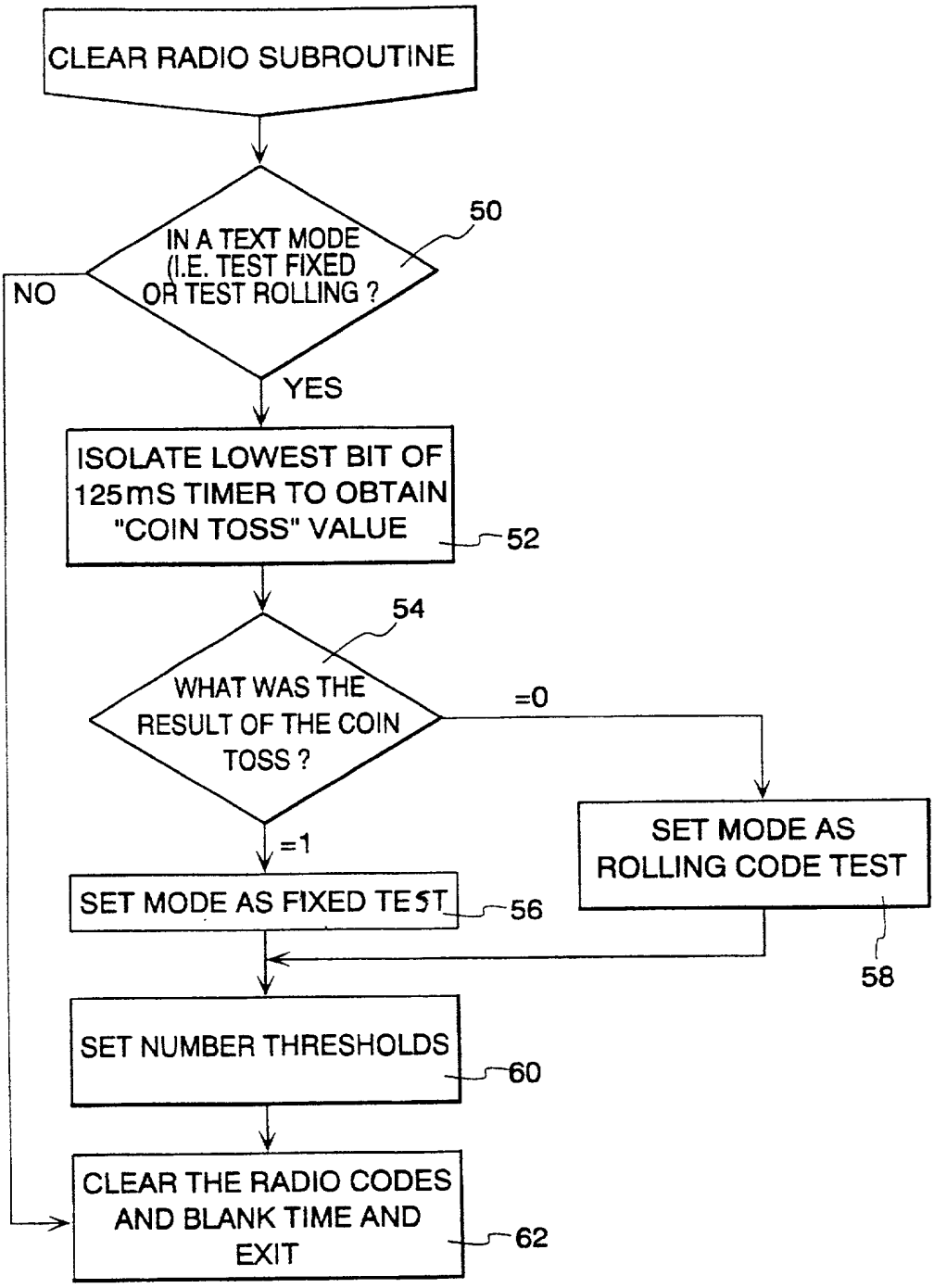

CLEAR RADIO SUBROUTINE
IN A TEXT MODE (I.E. TEST FIXED OR TEST ROLLING ?
50
NO
YES
ISOLATE LOWEST BIT OF 125mS TIMER TO OBTAIN "COIN TOSS" VALUE
52
54
WHAT WAS THE RESULT OF THE COIN TOSS ?
=0
=1
SET MODE AS ROLLING CODE TEST
SET MODE AS FIXED TEST
56
58
SET NUMBER THRESHOLDS
60
CLEAR THE RADIO CODES AND BLANK TIME AND EXIT
62

Fig. 15

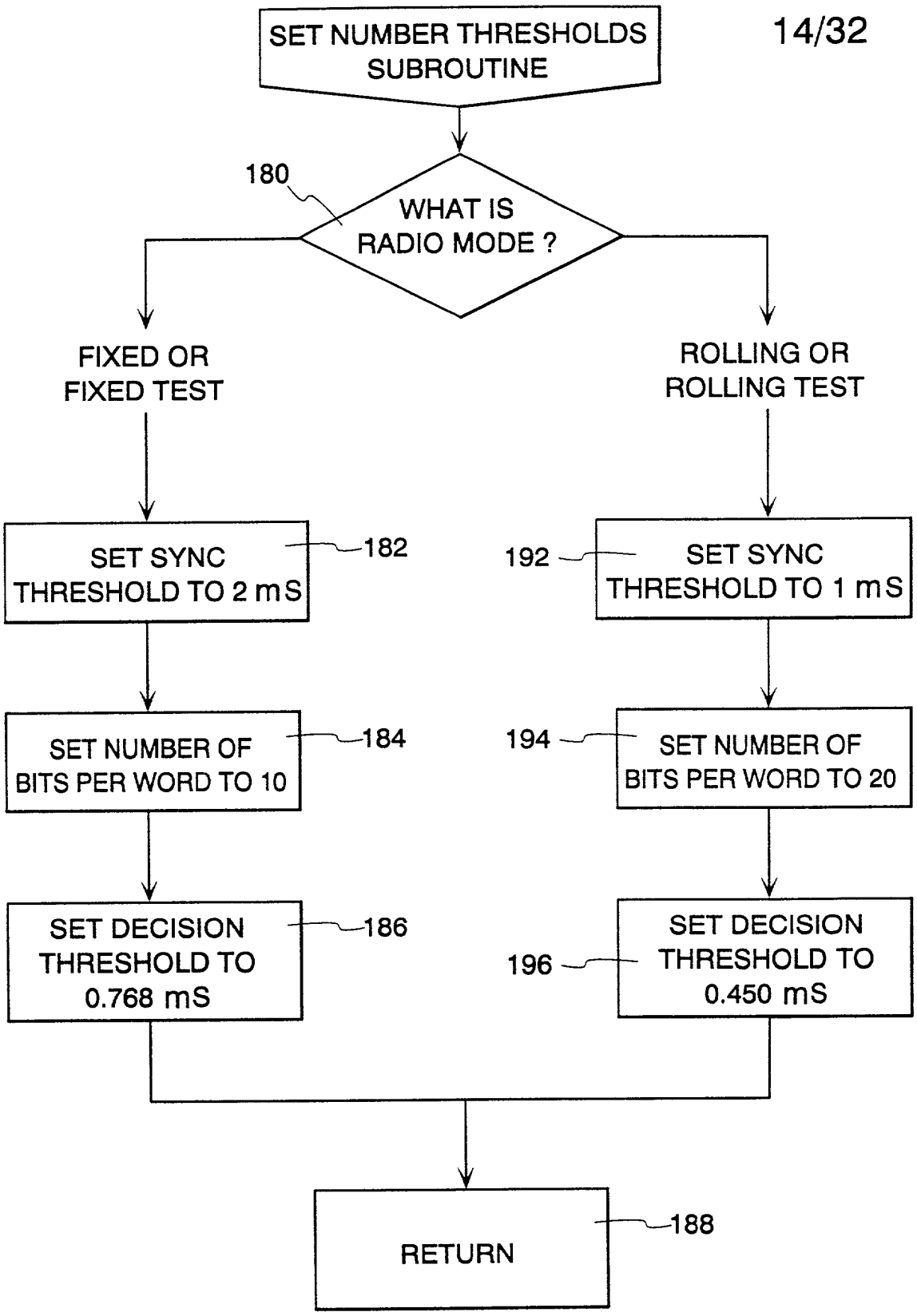


Fig. 16

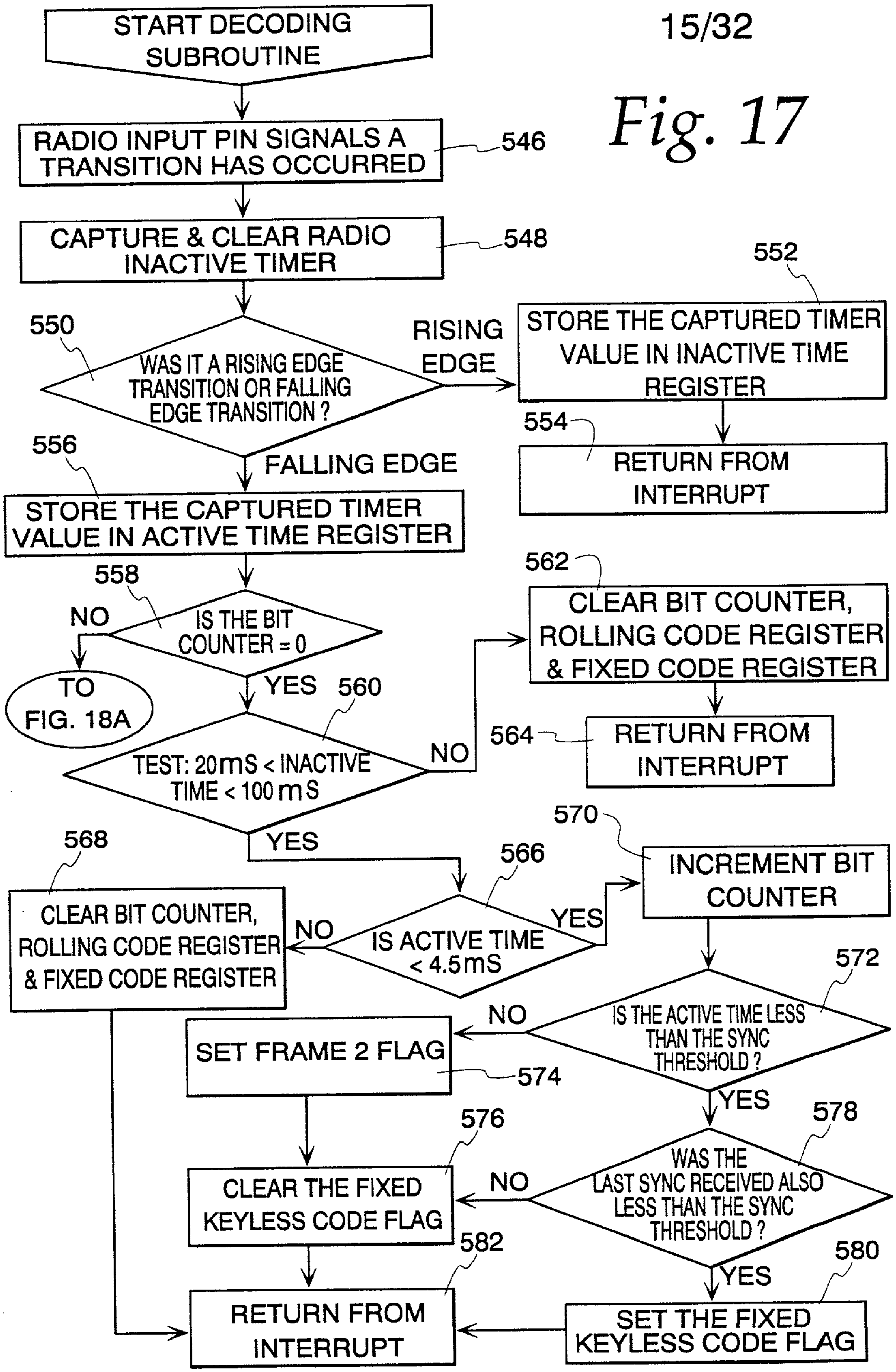
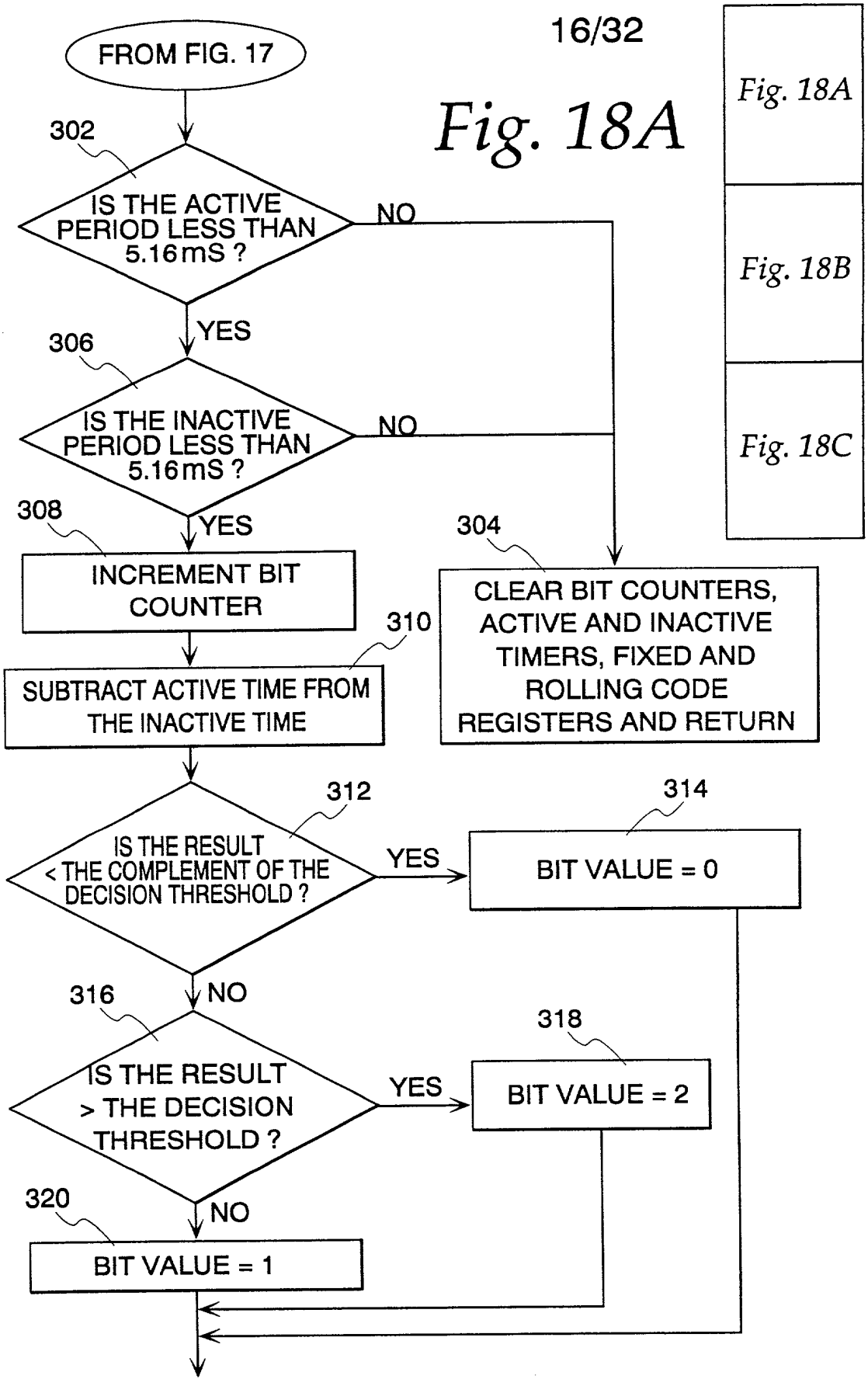

START DECODING SUBROUTINE
RADIO INPUT PIN SIGNALS A TRANSITION HAS OCCURRED
546
CAPTURE & CLEAR RADIO INACTIVE TIMER
548
550
WAS IT A RISING EDGE TRANSITION OR FALLING EDGE TRANSITION ?
RISING EDGE
552
STORE THE CAPTURED TIMER VALUE IN INACTIVE TIME REGISTER
554
RETURN FROM INTERRUPT
FALLING EDGE
556
STORE THE CAPTURED TIMER VALUE IN ACTIVE TIME REGISTER
558
IS THE BIT COUNTER = 0
NO
TO FIG. 18A
YES
560
TEST: 20mS < INACTIVE TIME < 100mS
NO
562
CLEAR BIT COUNTER, ROLLING CODE REGISTER & FIXED CODE REGISTER
564
RETURN FROM INTERRUPT
YES
566
IS ACTIVE TIME < 4.5mS
NO
568
CLEAR BIT COUNTER, ROLLING CODE REGISTER & FIXED CODE REGISTER
YES
570
INCREMENT BIT COUNTER
572
IS THE ACTIVE TIME LESS THAN THE SYNC THRESHOLD ?
NO
SET FRAME 2 FLAG
574
YES
578
WAS THE LAST SYNC RECEIVED ALSO LESS THAN THE SYNC THRESHOLD ?
NO
576
CLEAR THE FIXED KEYLESS CODE FLAG
YES
580
SET THE FIXED KEYLESS CODE FLAG
582
RETURN FROM INTERRUPT

Fig. 17

Fig. 18A

Fig. 18A
Fig. 18B
Fig. 18C



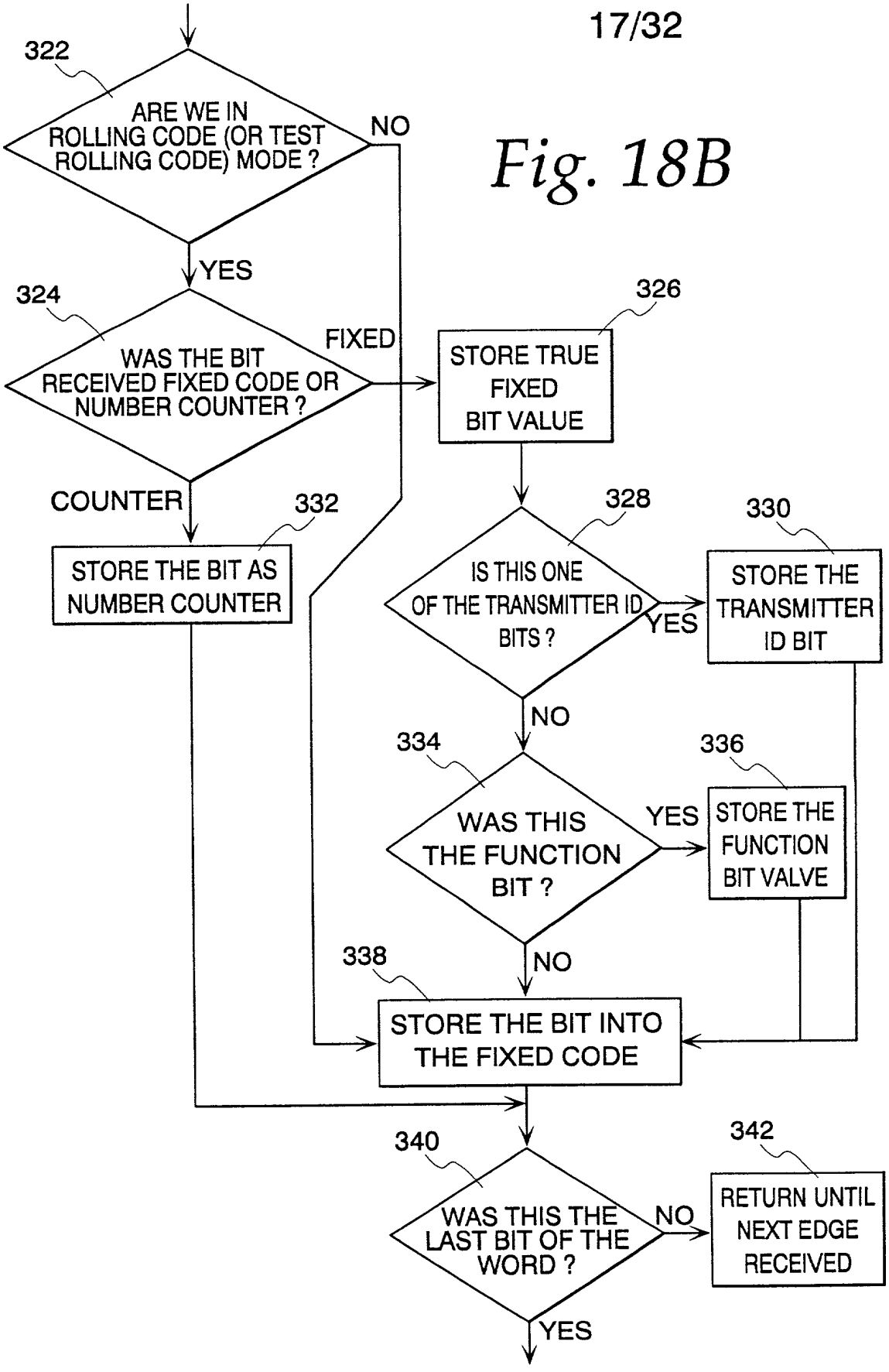


Fig. 18B

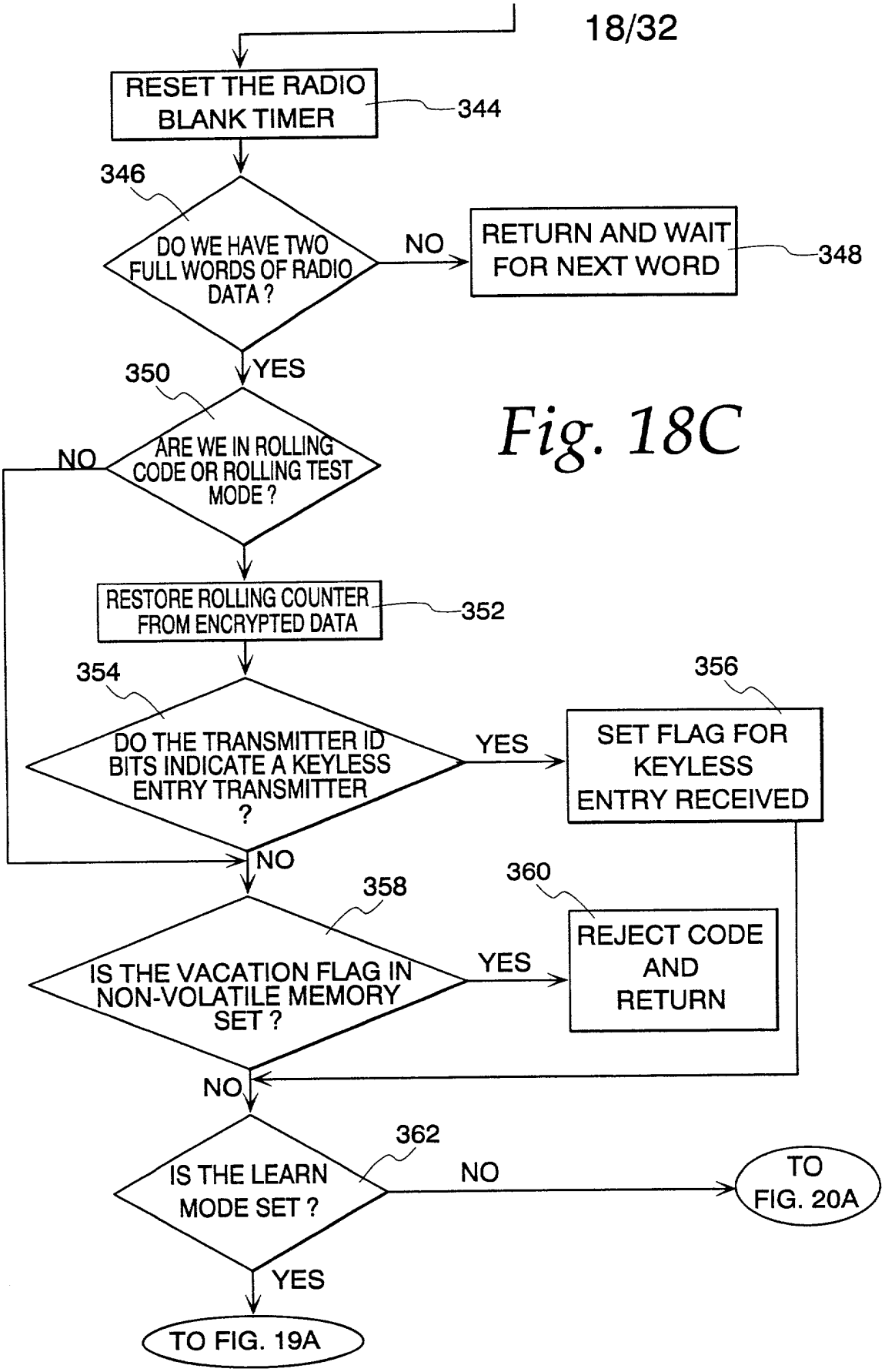


Fig. 18C

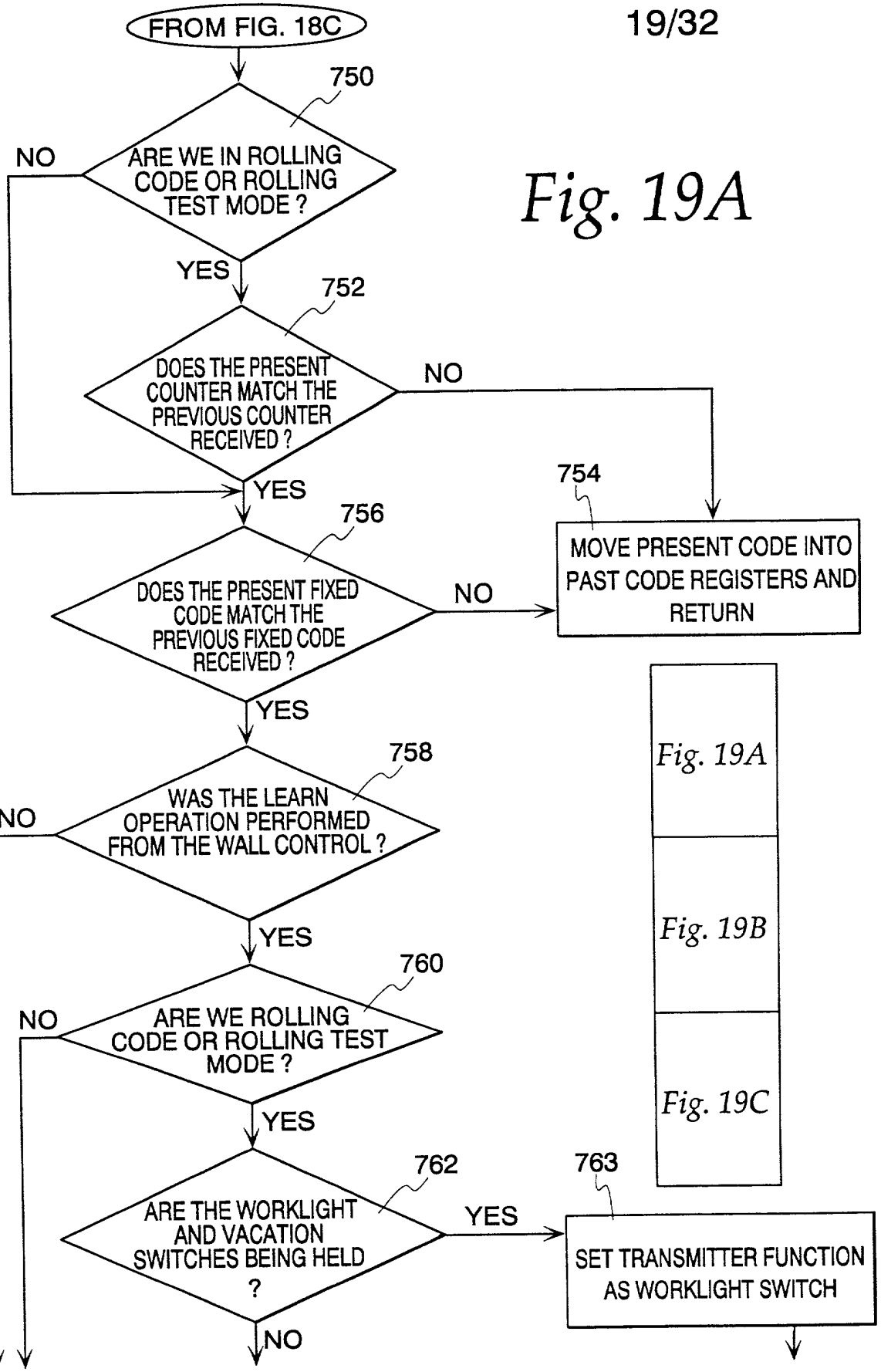


Fig. 19A

Fig. 19A
Fig. 19B
Fig. 19C

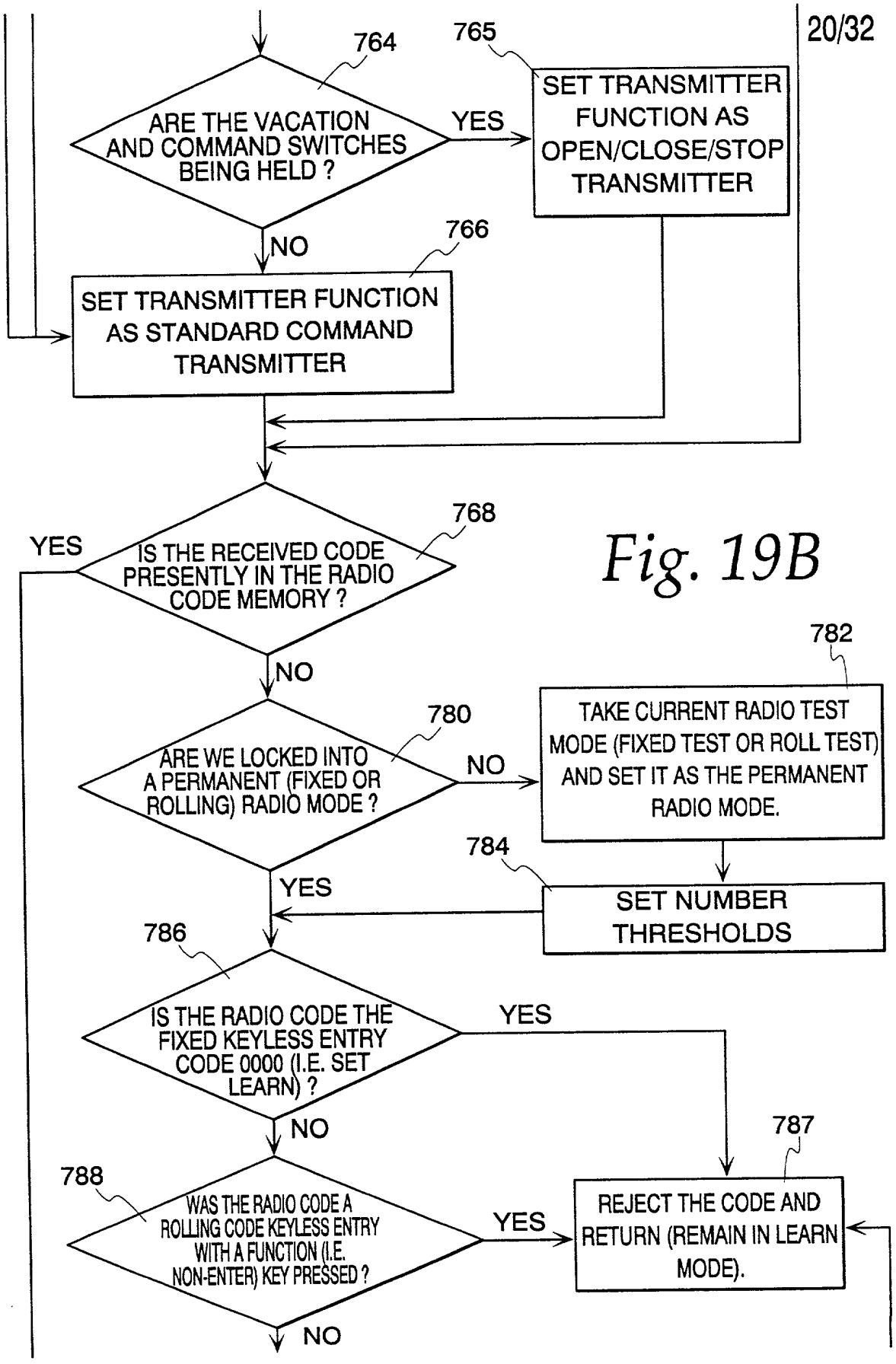


Fig. 19B

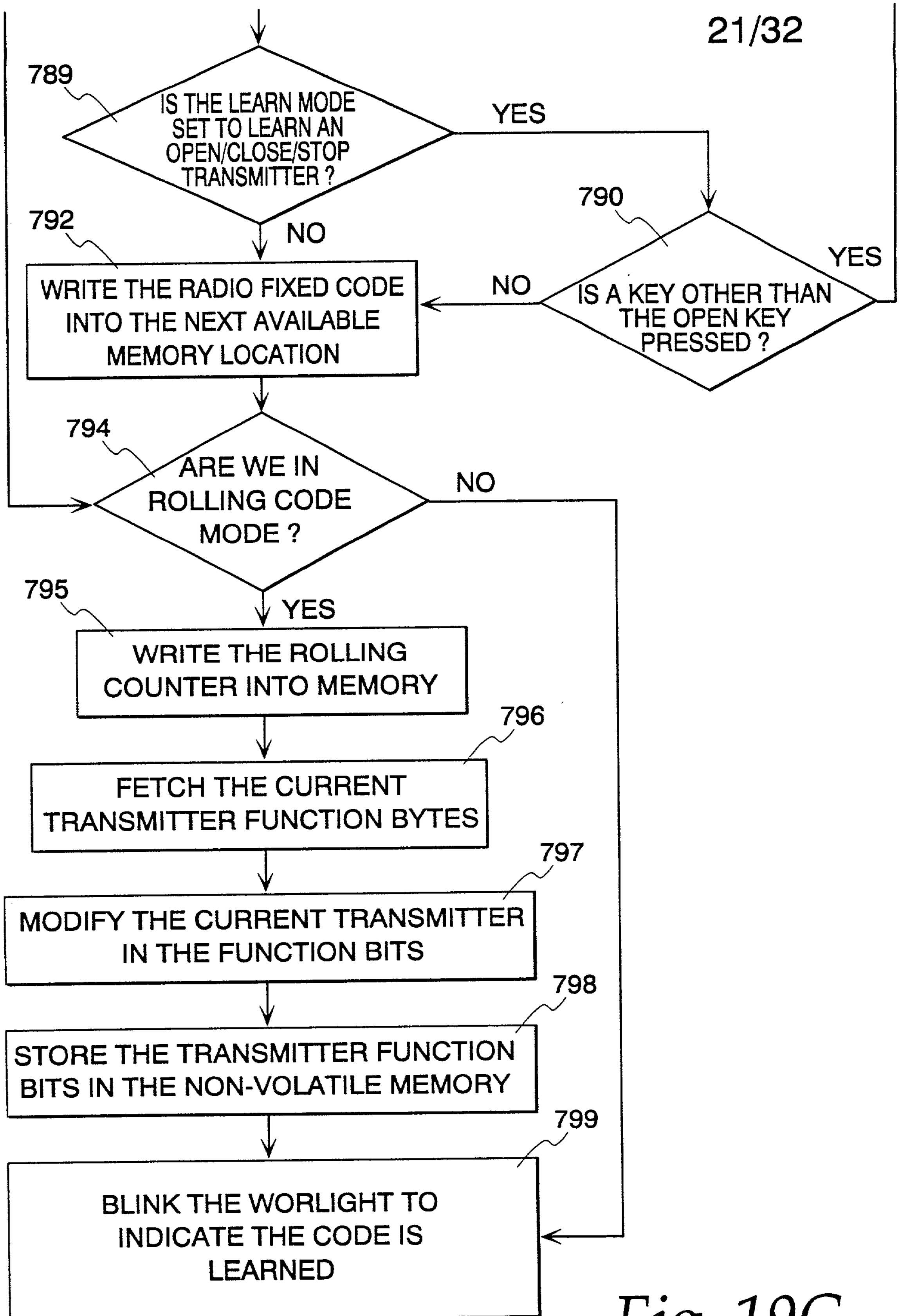


Fig. 19C

Fig. 20A

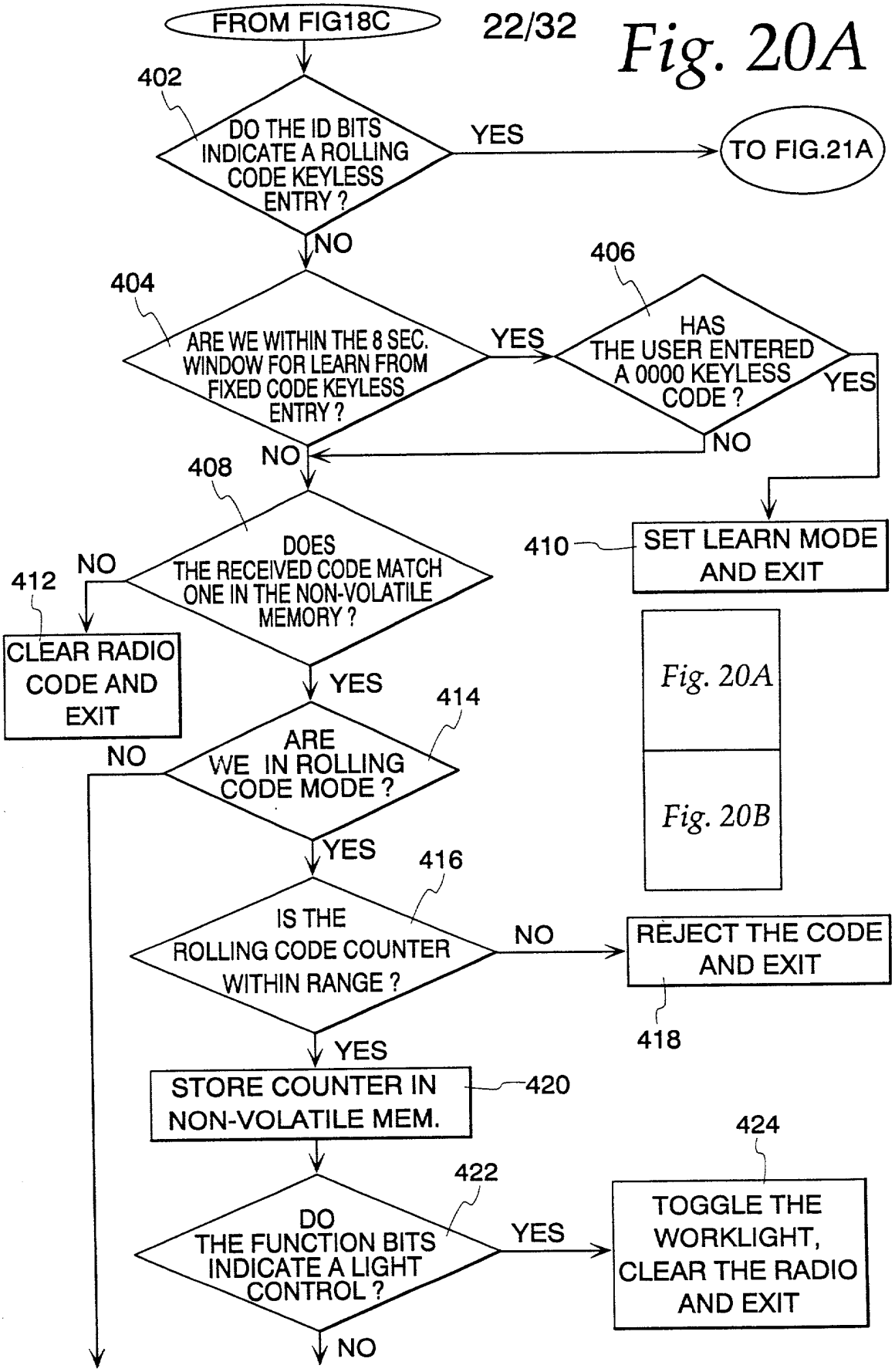


Fig. 20A

Fig. 20B

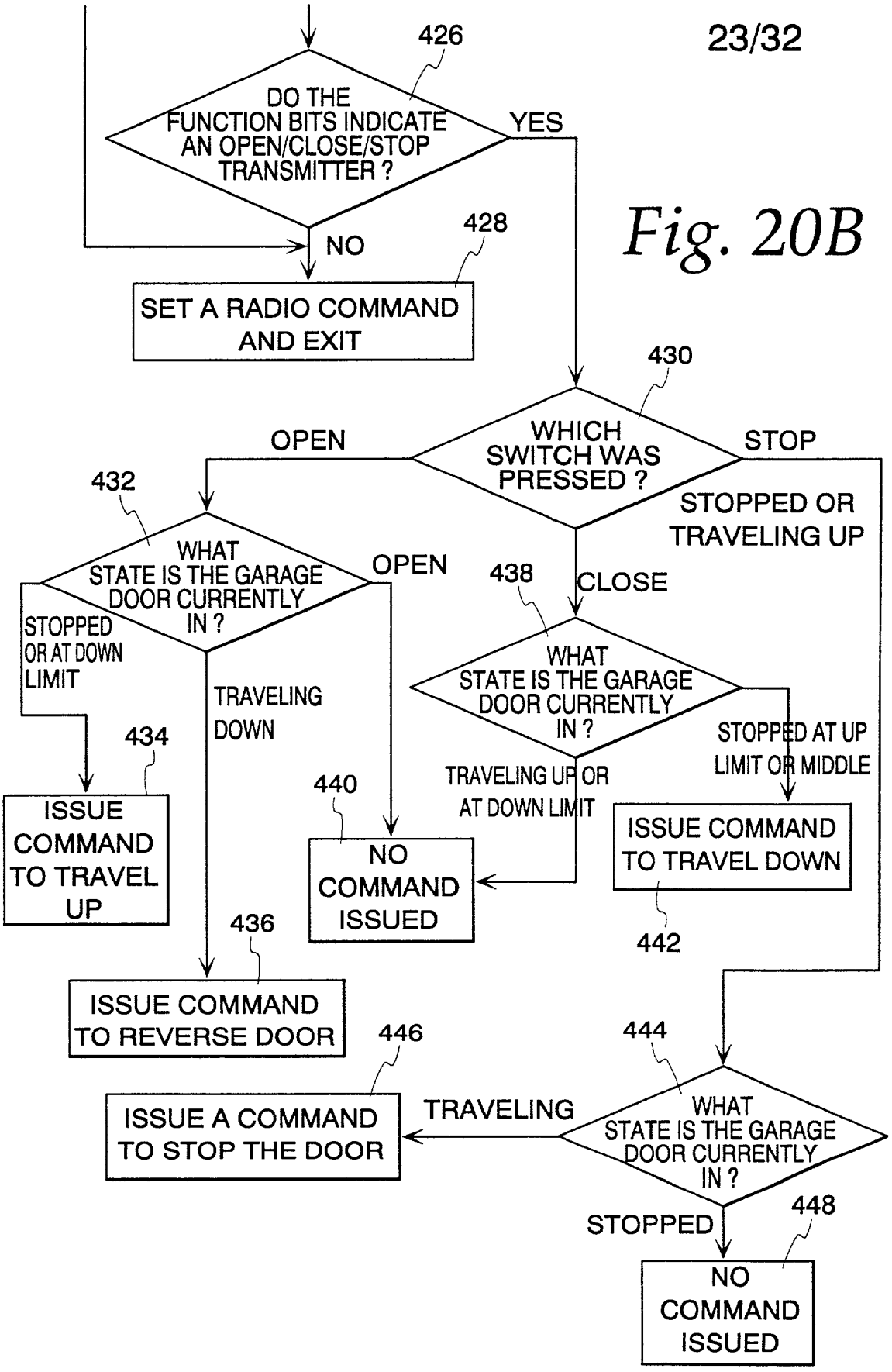


Fig. 20B

Fig. 21A

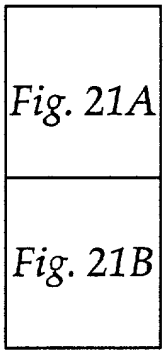
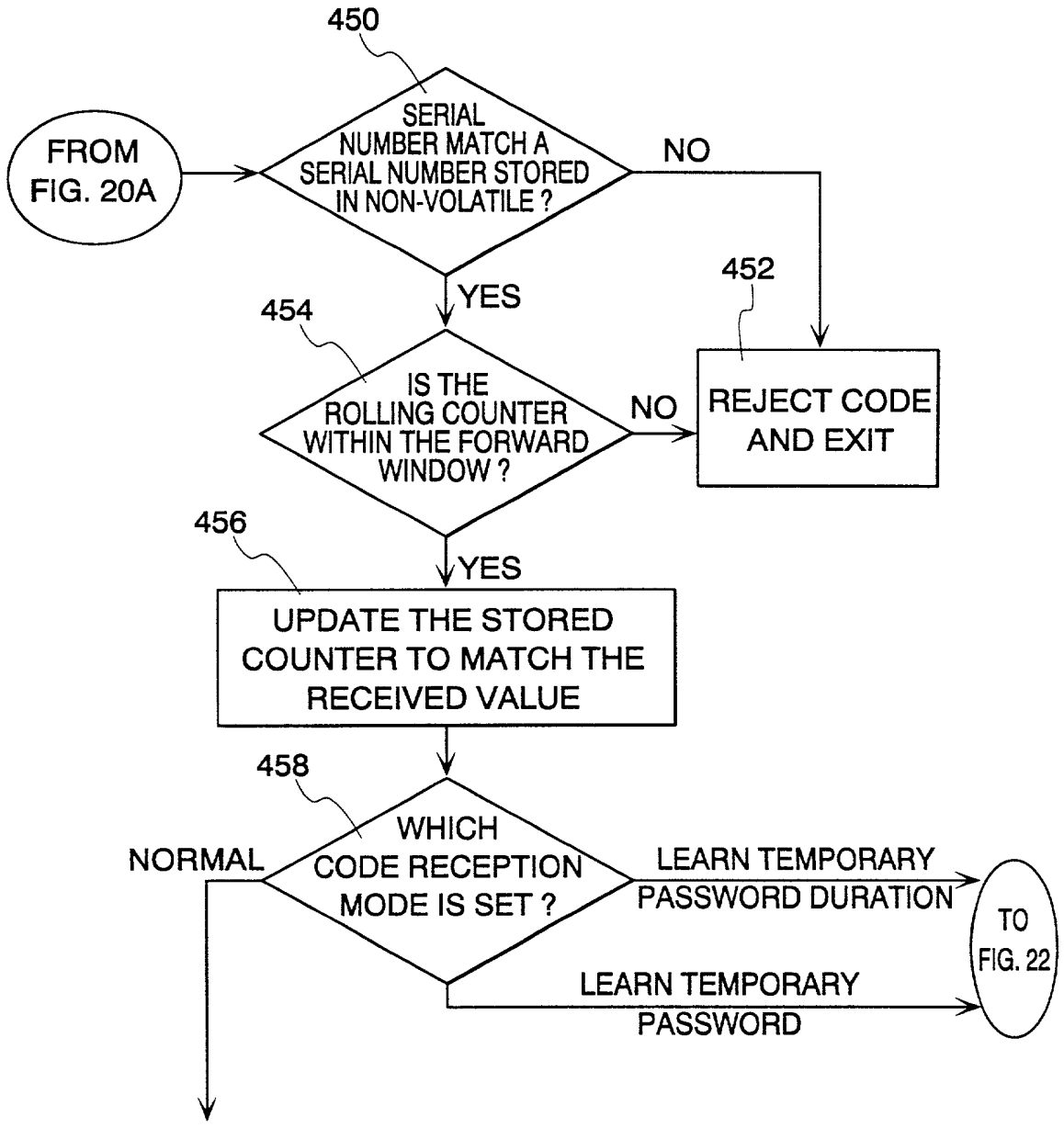


Fig. 21A
Fig. 21B


450
FROM FIG. 20A
SERIAL NUMBER MATCH A SERIAL NUMBER STORED IN NON-VOLATILE ?
NO
YES
452
454
IS THE ROLLING COUNTER WITHIN THE FORWARD WINDOW ?
NO
REJECT CODE AND EXIT
YES
456
UPDATE THE STORED COUNTER TO MATCH THE RECEIVED VALUE
458
WHICH CODE RECEPTION MODE IS SET ?
NORMAL
LEARN TEMPORARY PASSWORD DURATION
LEARN TEMPORARY PASSWORD
TO FIG. 22

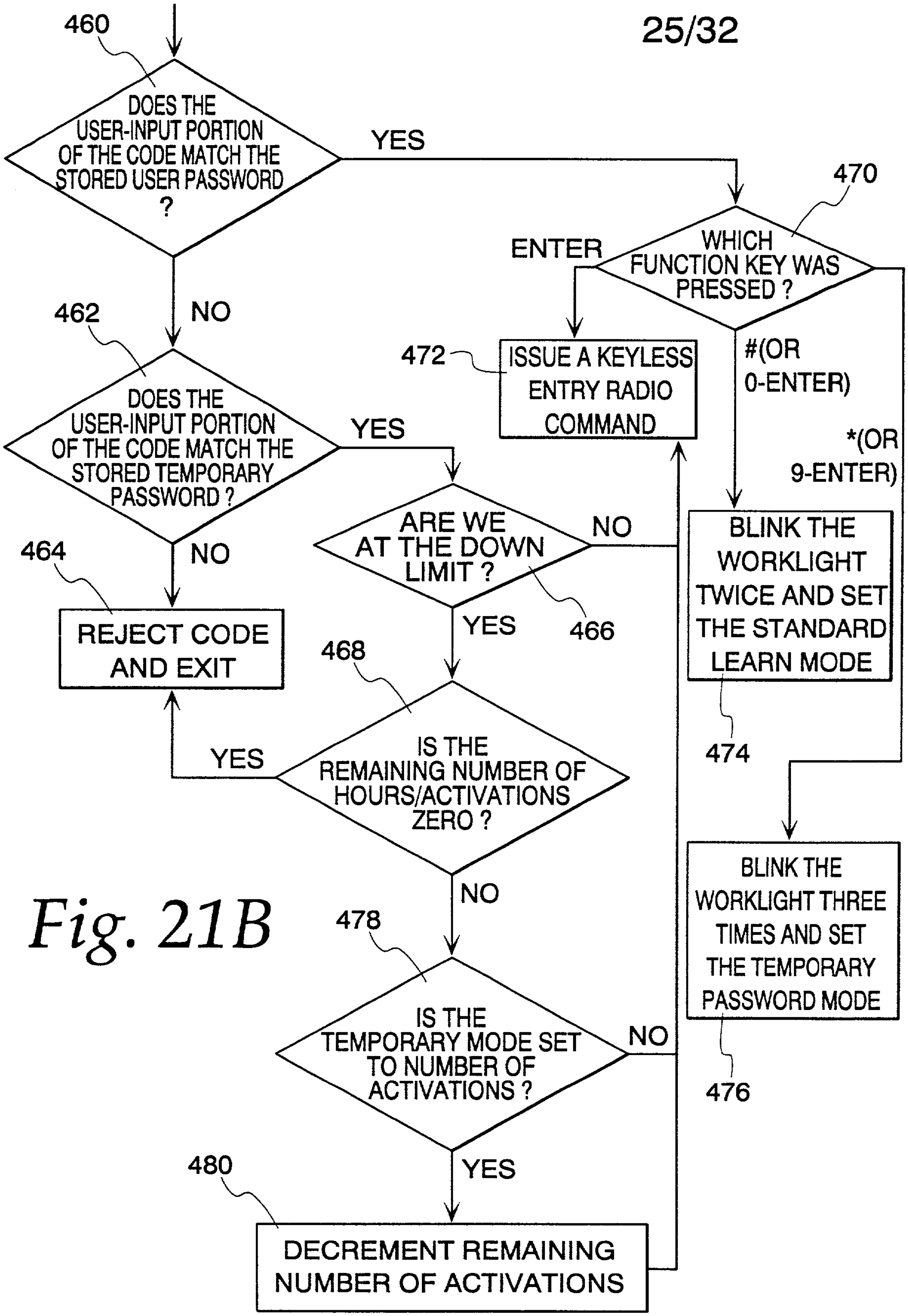

460
DOES THE USER-INPUT PORTION OF THE CODE MATCH THE STORED USER PASSWORD ?
YES
NO
470
WHICH FUNCTION KEY WAS PRESSED ?
ENTER
#(OR 0-ENTER)
*(OR 9-ENTER)
472
ISSUE A KEYLESS ENTRY RADIO COMMAND
462
DOES THE USER-INPUT PORTION OF THE CODE MATCH THE STORED TEMPORARY PASSWORD ?
YES
NO
ARE WE AT THE DOWN LIMIT ?
NO
YES
466
464
REJECT CODE AND EXIT
BLINK THE WORKLIGHT TWICE AND SET THE STANDARD LEARN MODE
474
468
IS THE REMAINING NUMBER OF HOURS/ACTIVATIONS ZERO ?
YES
NO
BLINK THE WORKLIGHT THREE TIMES AND SET THE TEMPORARY PASSWORD MODE
476
478
IS THE TEMPORARY MODE SET TO NUMBER OF ACTIVATIONS ?
NO
YES
480
DECREMENT REMAINING NUMBER OF ACTIVATIONS

Fig. 21B

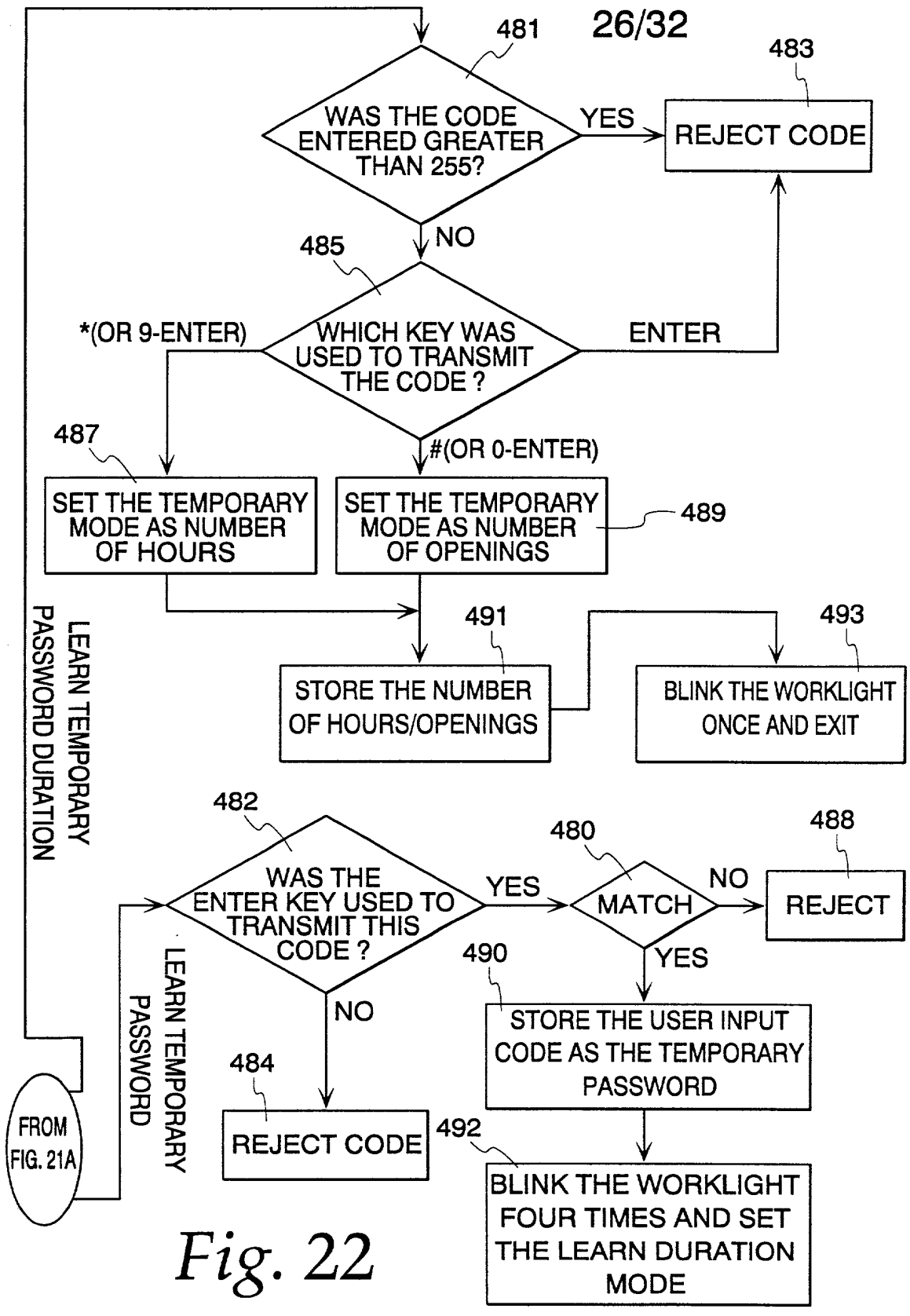


Fig. 22

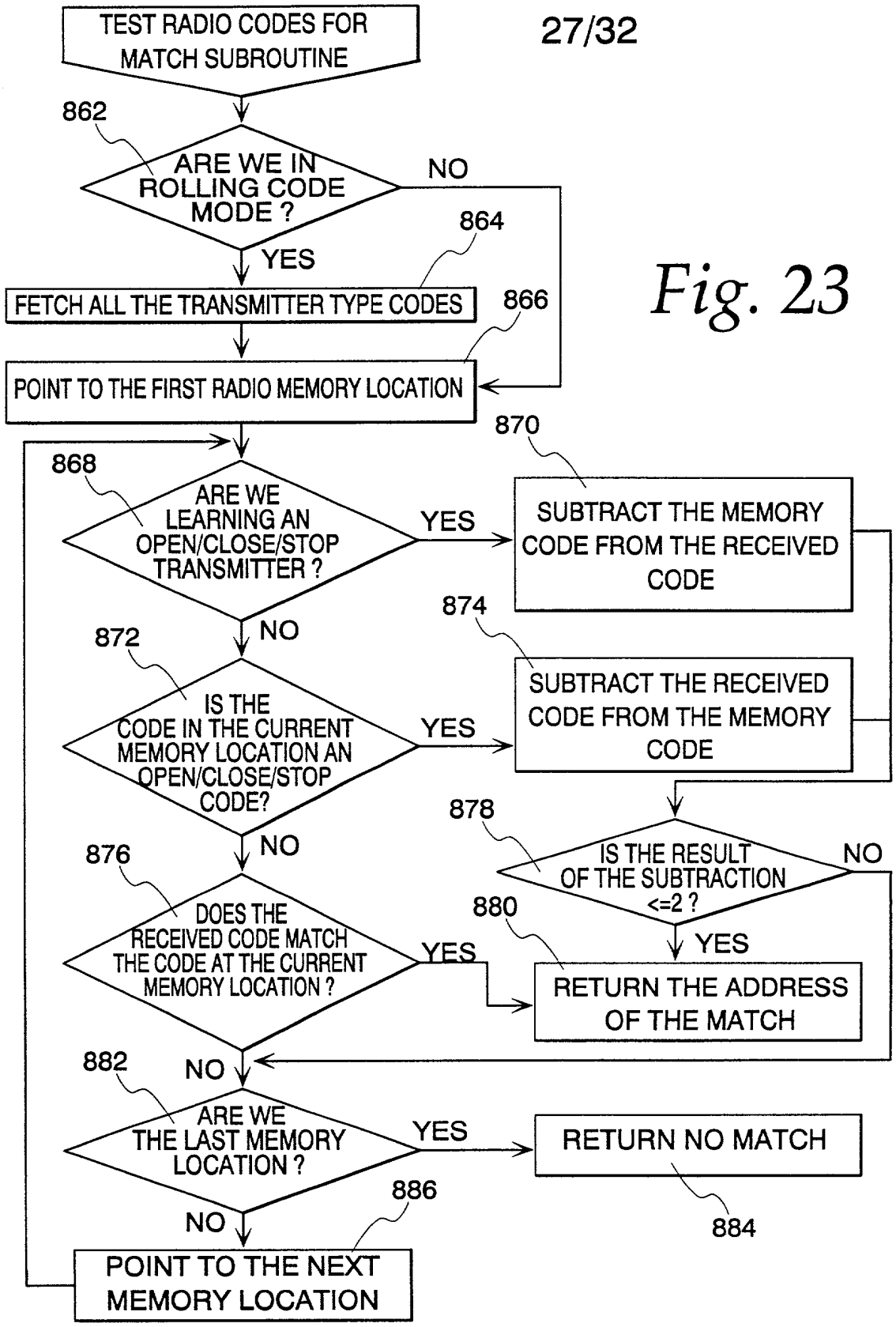

TEST RADIO CODES FOR MATCH SUBROUTINE
862
ARE WE IN ROLLING CODE MODE ?
NO
YES
864
FETCH ALL THE TRANSMITTER TYPE CODES
866
POINT TO THE FIRST RADIO MEMORY LOCATION
870
868
ARE WE LEARNING AN OPEN/CLOSE/STOP TRANSMITTER ?
YES
SUBTRACT THE MEMORY CODE FROM THE RECEIVED CODE
874
NO
872
IS THE CODE IN THE CURRENT MEMORY LOCATION AN OPEN/CLOSE/STOP CODE?
YES
SUBTRACT THE RECEIVED CODE FROM THE MEMORY CODE
878
IS THE RESULT OF THE SUBTRACTION <=2 ?
NO
YES
880
NO
876
DOES THE RECEIVED CODE MATCH THE CODE AT THE CURRENT MEMORY LOCATION ?
YES
RETURN THE ADDRESS OF THE MATCH
882
NO
ARE WE THE LAST MEMORY LOCATION ?
YES
RETURN NO MATCH
884
886
NO
POINT TO THE NEXT MEMORY LOCATION

Fig. 23

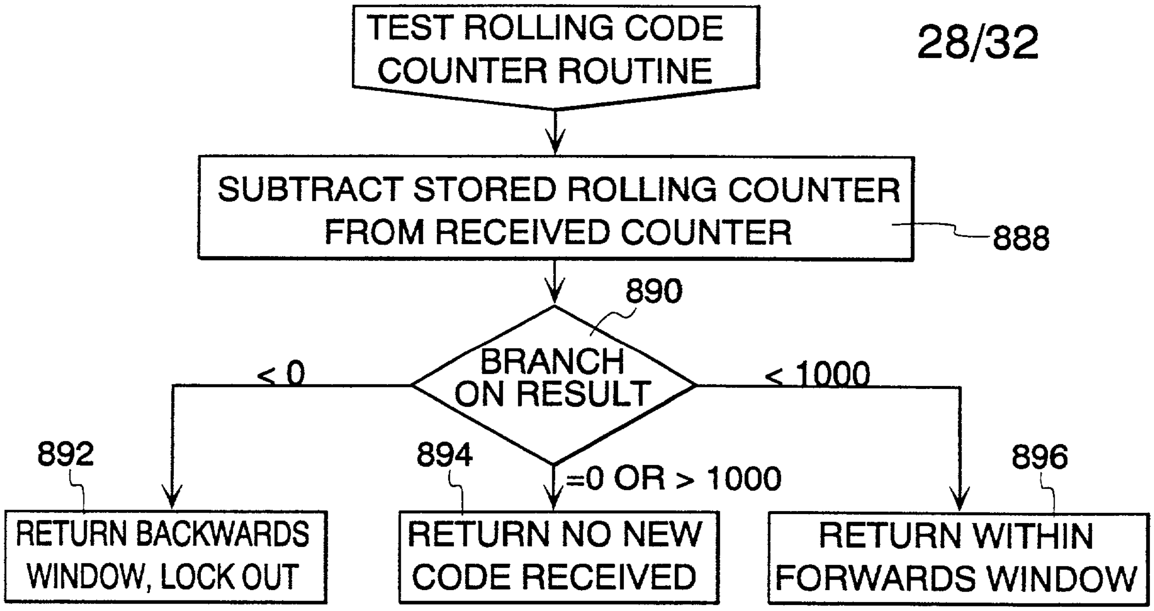

TEST ROLLING CODE COUNTER ROUTINE
SUBTRACT STORED ROLLING COUNTER FROM RECEIVED COUNTER
888
890
BRANCH ON RESULT
< 0
< 1000
=0 OR > 1000
892
894
896
RETURN BACKWARDS WINDOW, LOCK OUT
RETURN NO NEW CODE RECEIVED
RETURN WITHIN FORWARDS WINDOW

Fig. 24

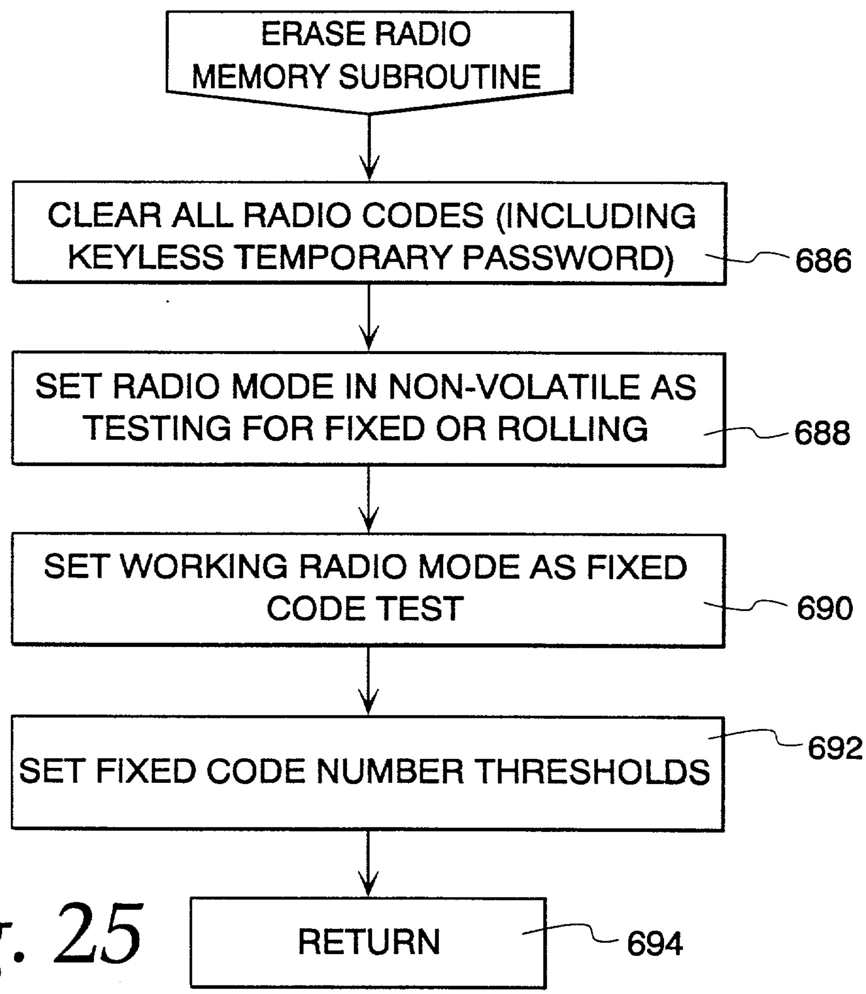

ERASE RADIO MEMORY SUBROUTINE
CLEAR ALL RADIO CODES (INCLUDING KEYLESS TEMPORARY PASSWORD)
686
SET RADIO MODE IN NON-VOLATILE AS TESTING FOR FIXED OR ROLLING
688
SET WORKING RADIO MODE AS FIXED CODE TEST
690
SET FIXED CODE NUMBER THRESHOLDS
692
RETURN
694

Fig. 25

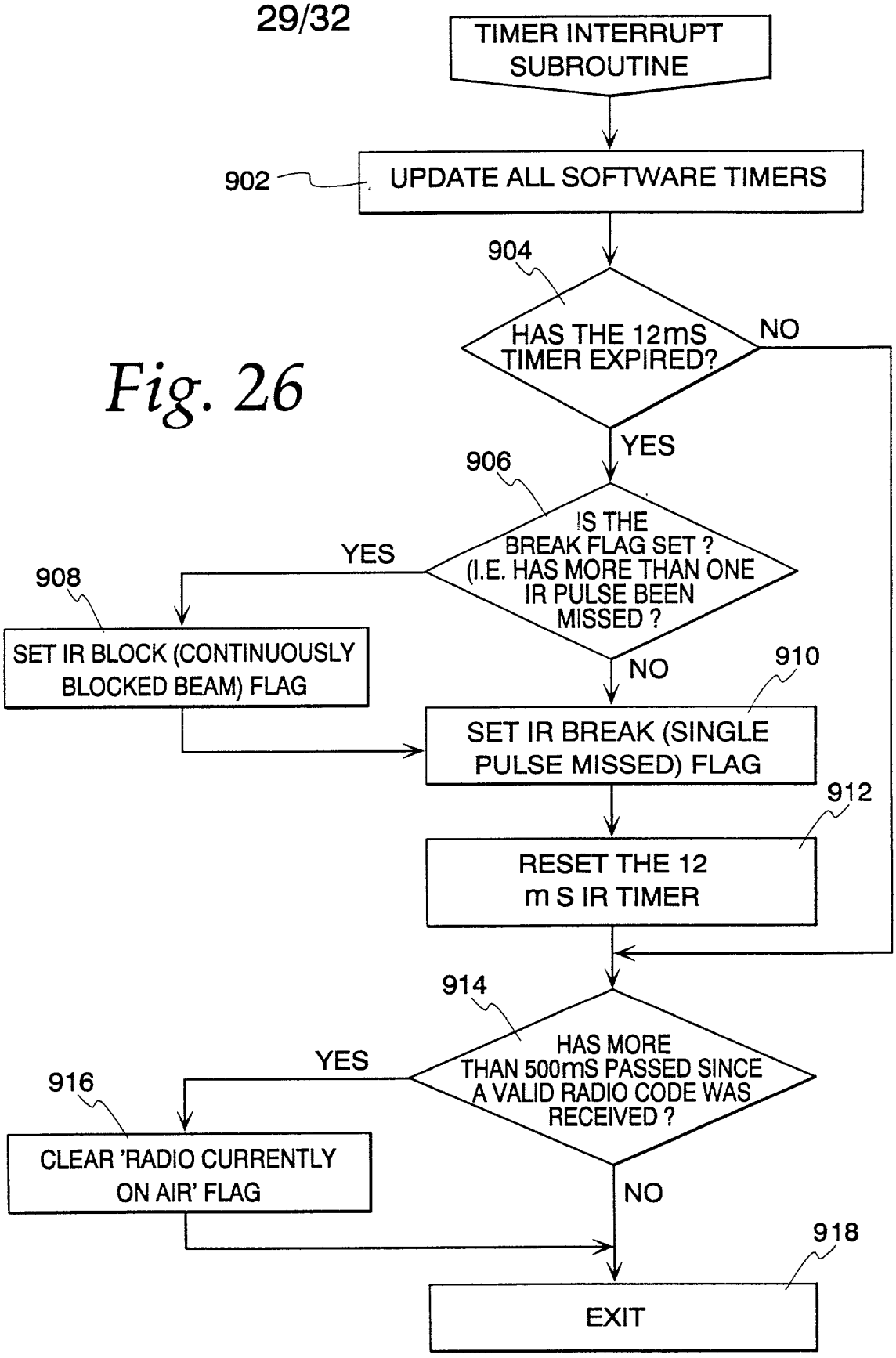


Fig. 26

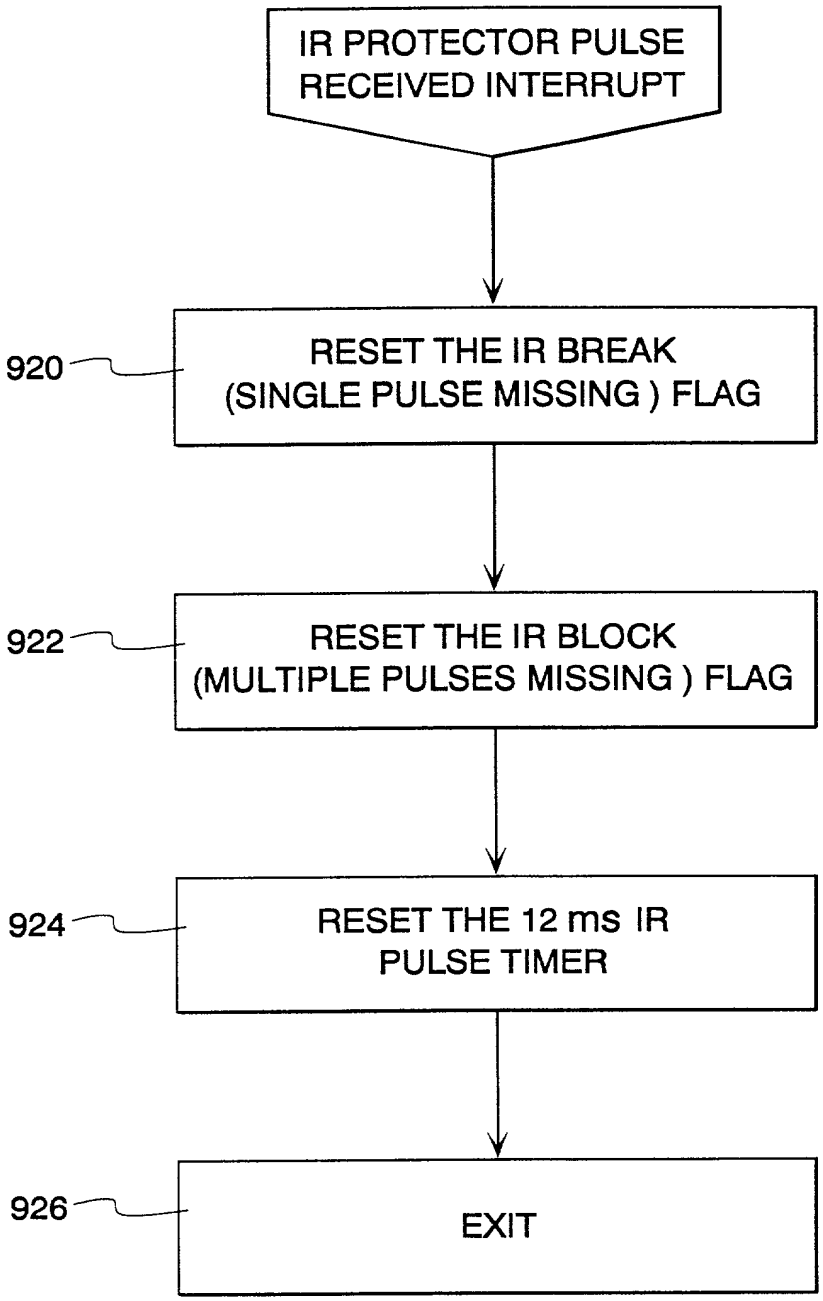
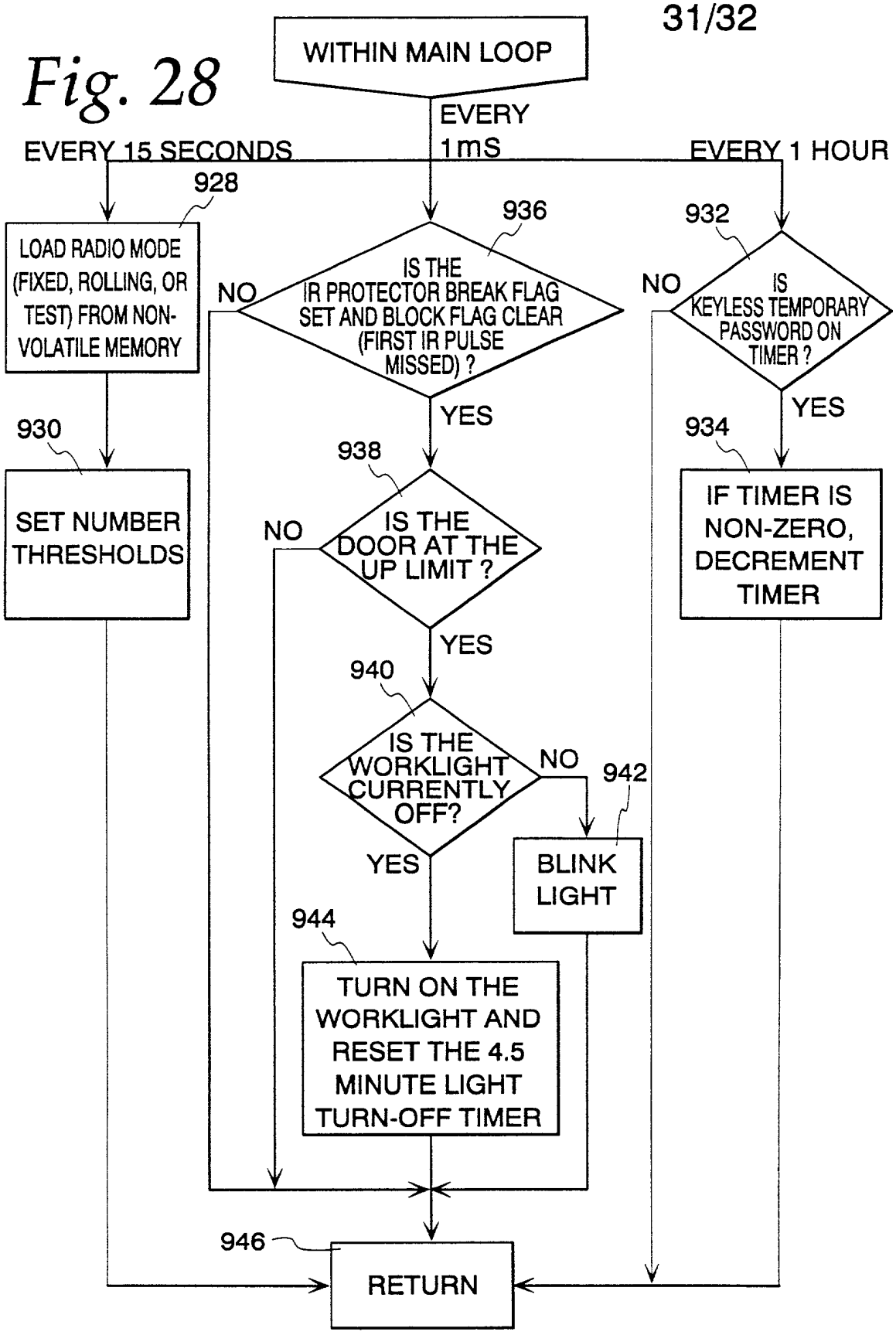

IR PROTECTOR PULSE RECEIVED INTERRUPT
920
RESET THE IR BREAK (SINGLE PULSE MISSING) FLAG
922
RESET THE IR BLOCK (MULTIPLE PULSES MISSING) FLAG
924
RESET THE 12 ms IR PULSE TIMER
926
EXIT

Fig. 27

Fig. 28



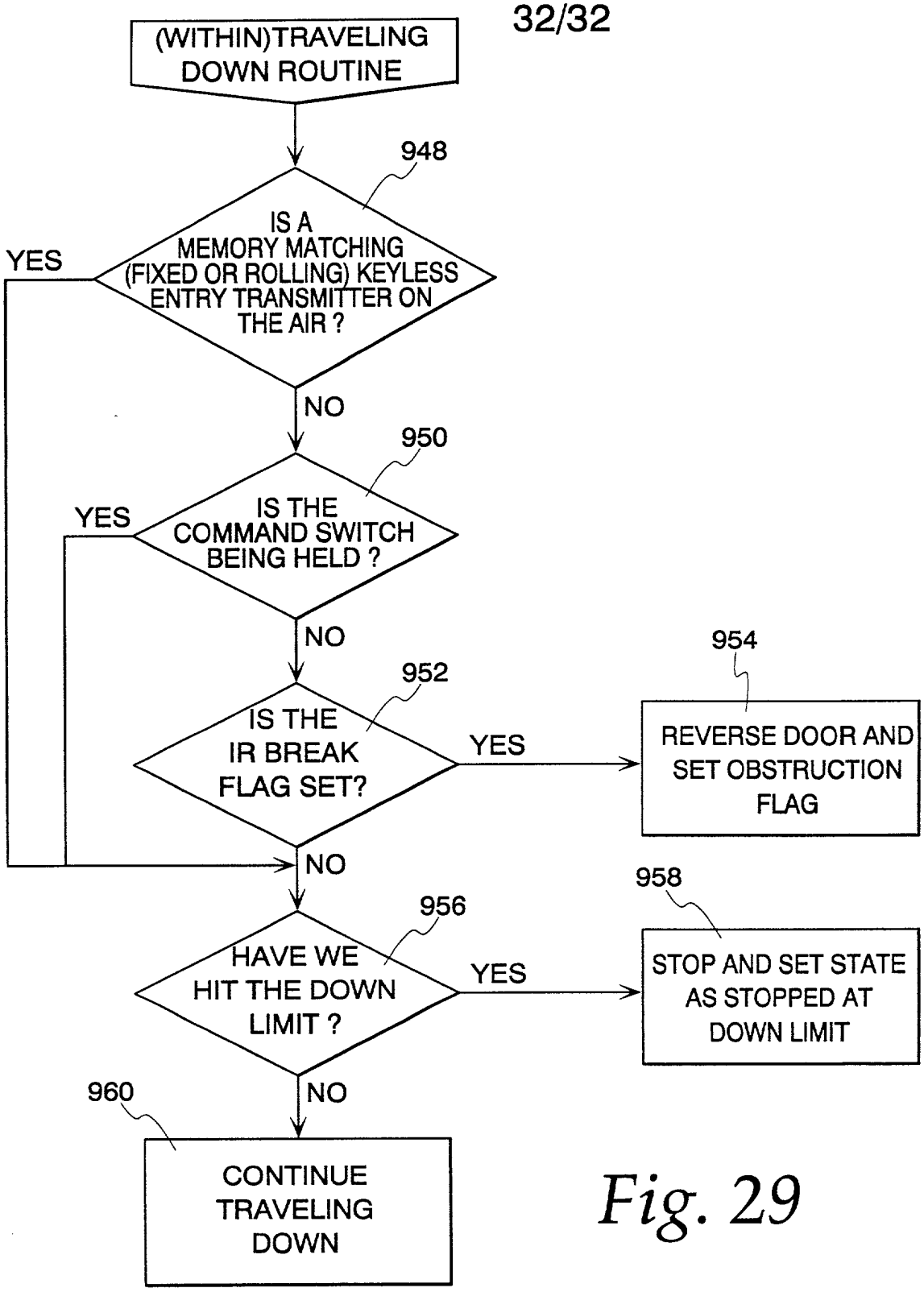


Fig. 29

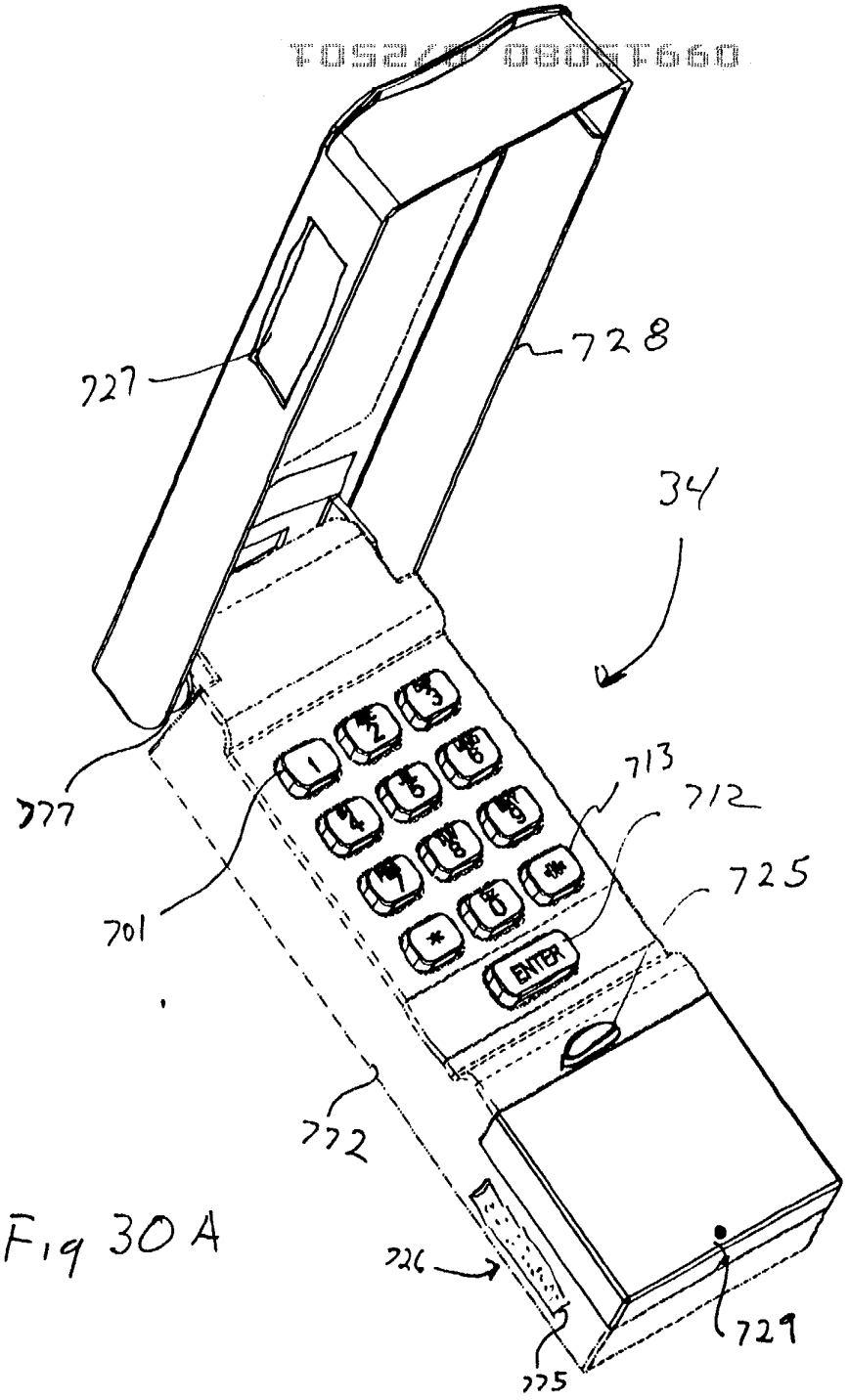


Fig 30A

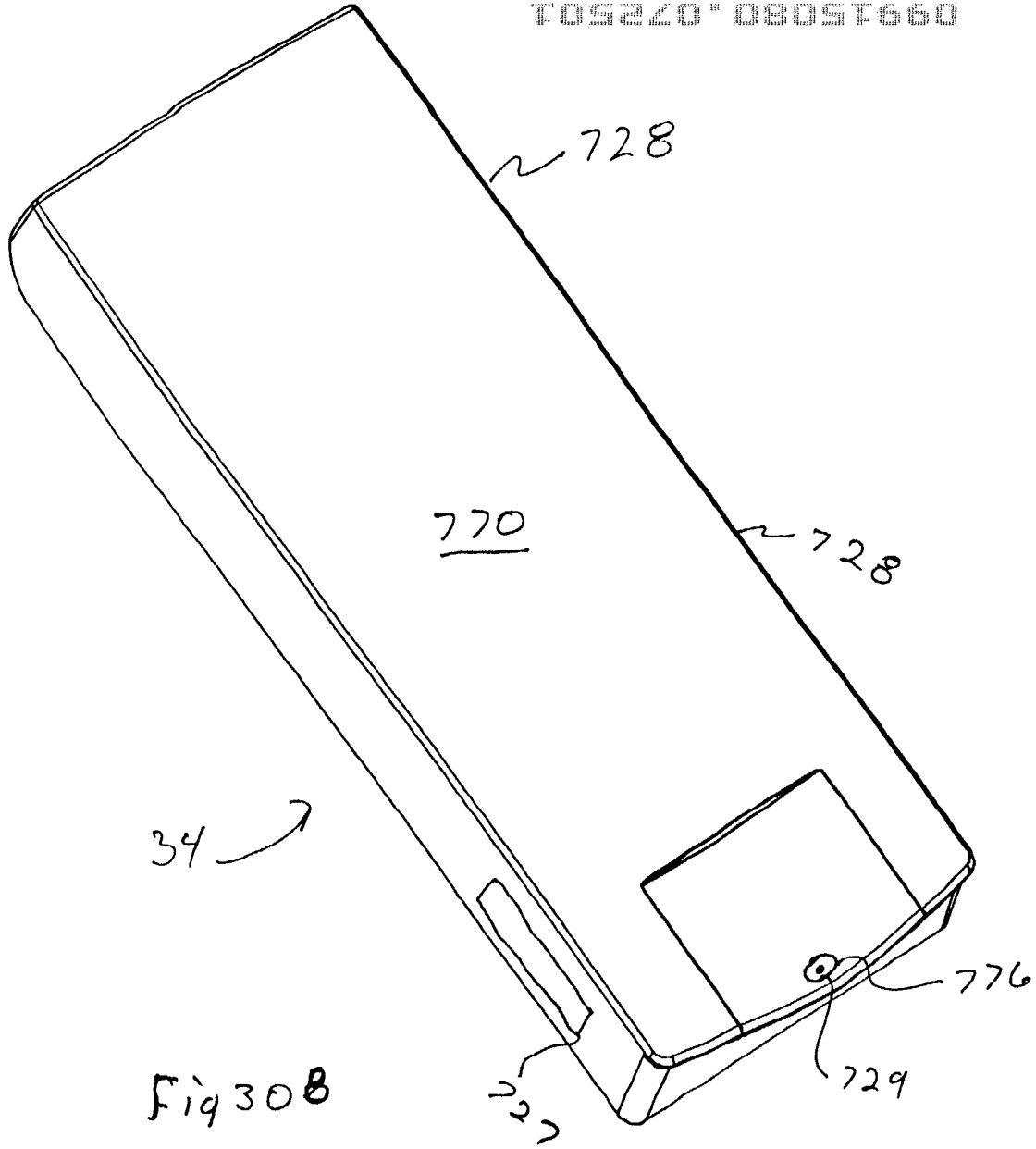


Fig 30B

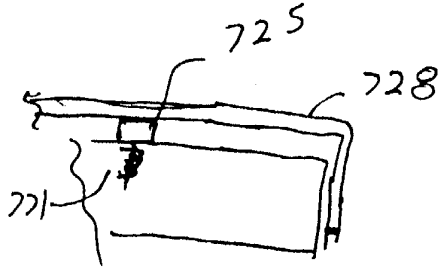


Fig 31A

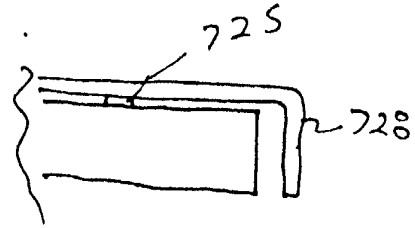


Fig 31B

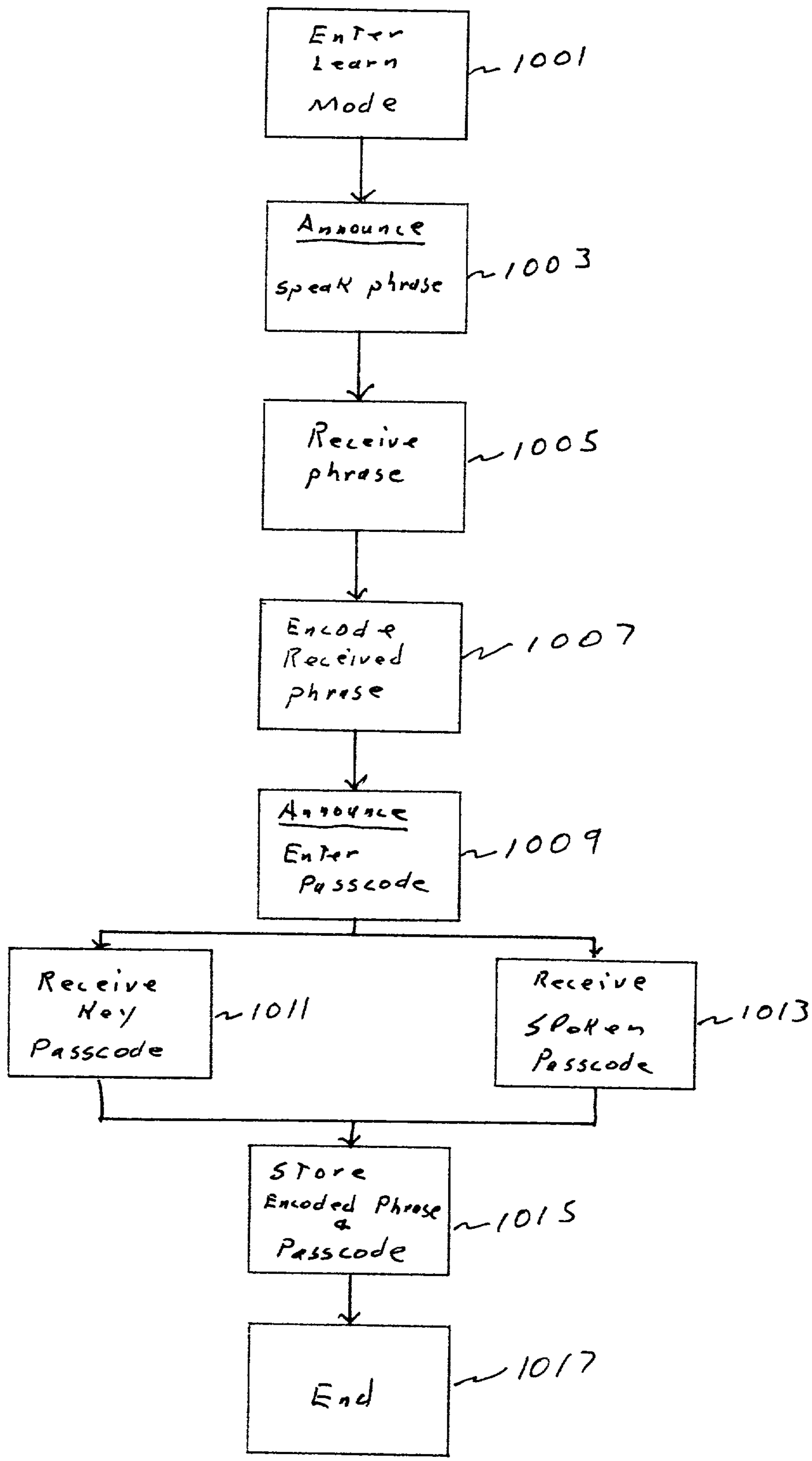

Enter Learn Mode
1001
Announce
speak phrase
1003
Receive phrase
1005
Encode Received phrase
1007
Announce
Enter Passcode
1009
Receive Key Passcode
1011
Receive Spoken Passcode
1013
Store Encoded Phrase & Passcode
1015
End
1017

Fig 32

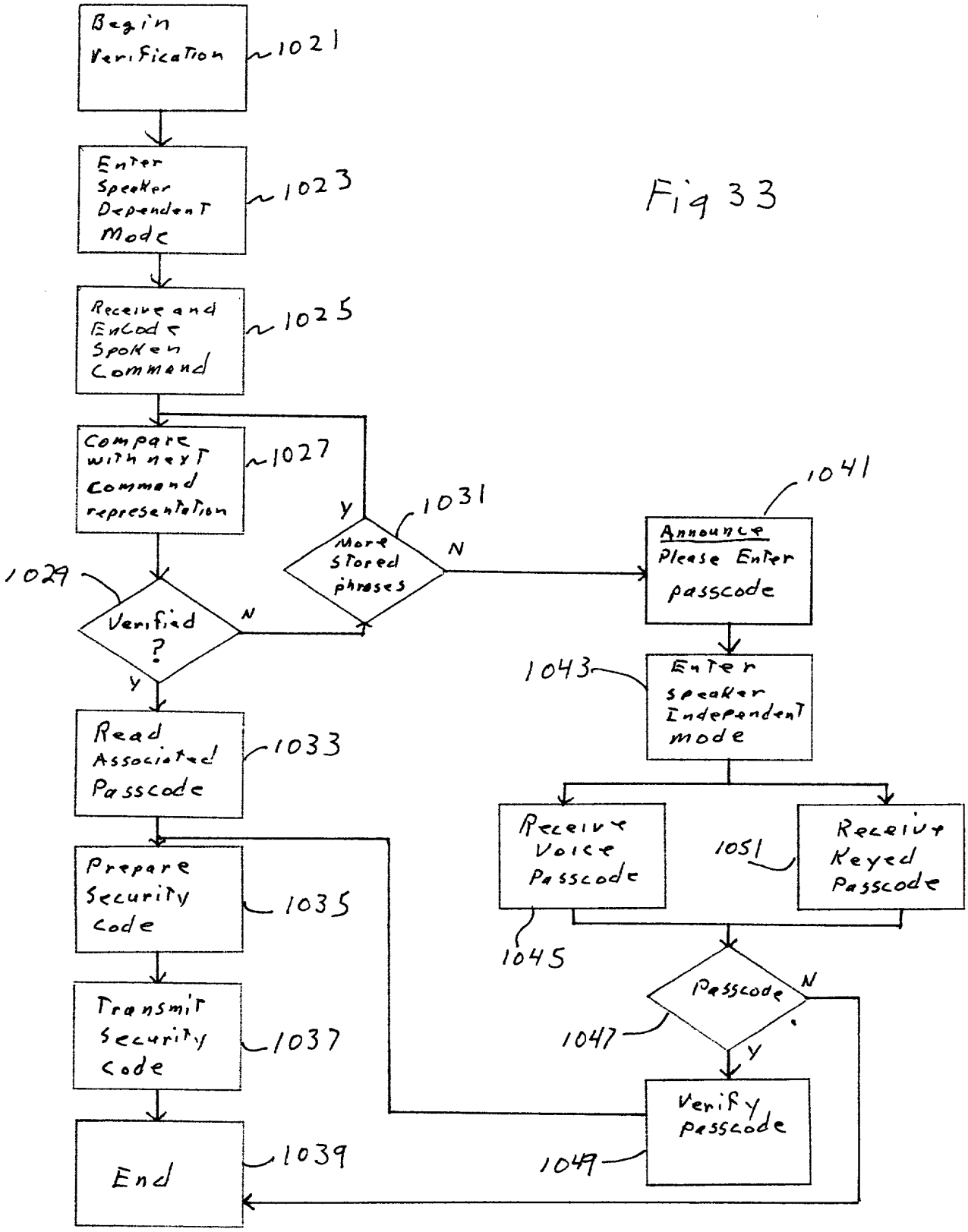

Begin Verification
1021
Enter Speaker Dependent Mode
1023
Receive and Encode Spoken Command
1025
Compare with next Command representation
1027
More Stored phrases
1031
Y
N
Verified ?
1029
N
Y
Read Associated Passcode
1033
Prepare Security code
1035
Transmit Security code
1037
End
1039
Announce Please Enter passcode
1041
Enter speaker Independent mode
1043
Receive Voice Passcode
1045
Receive Keyed Passcode
1051
Passcode
1047
N
Y
Verify passcode
1049

Fig 33

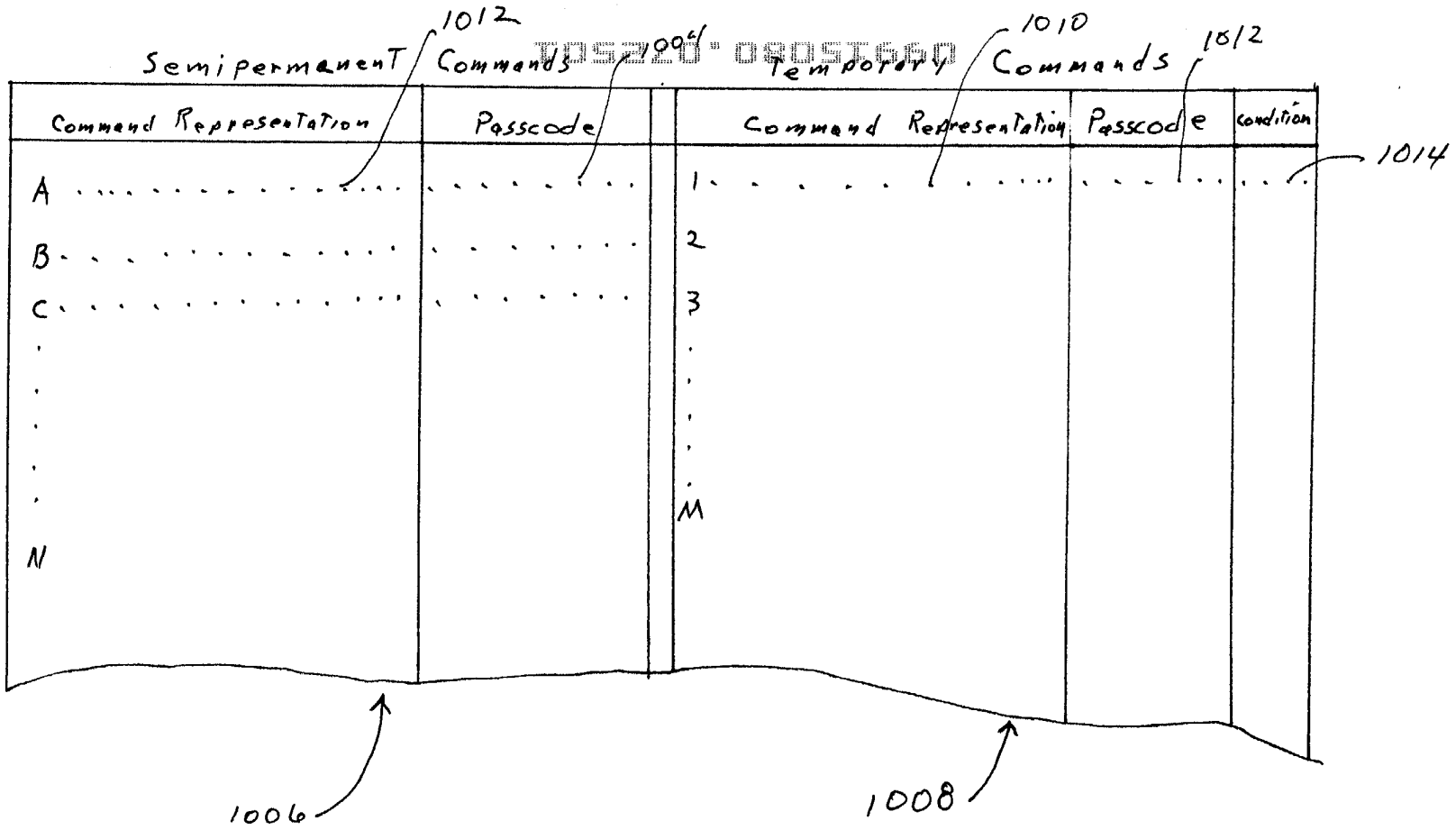

Semipermanent Commands
Temporary Commands
1012
1010
1012
1014
Command Representation
Passcode
Command Representation
Passcode
condition
A
B
C
N
1
2
3
M
1006
1008

Fig 34

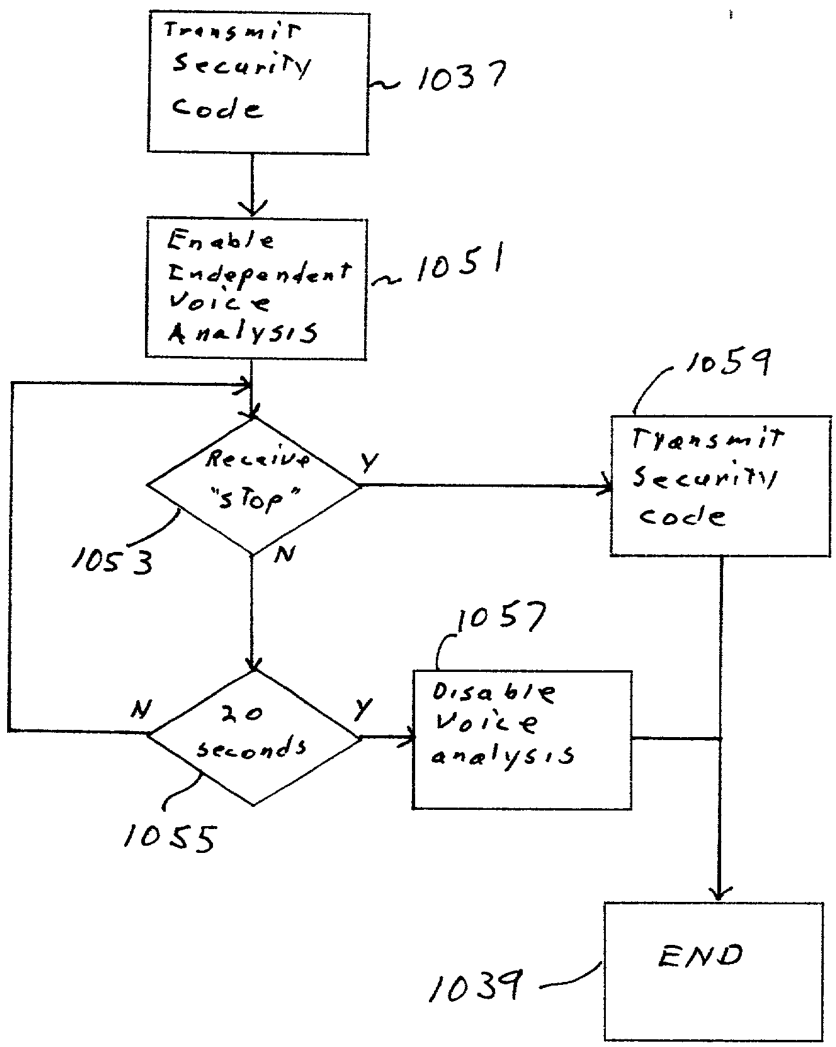

Transmit Security Code
1037
Enable Independent Voice Analysis
1051
1059
Receive "STop"
Y
Transmit Security code
1053
N
1057
N
20 seconds
Y
Disable Voice analysis
1055
END
1039

Fig 35